Parkinsonism and Related Disorders 63 (2019) 169–173

Contents lists available at ScienceDirect

Parkinsonism and Related Disorders

journal homepage: www.elsevier.com/locate/parkreldis

Creativity related to dopaminergic treatment: A multicenter study

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ARTICLE INFO

Keywords:
Impulse control disorder
Dopamine agonists
Enhanced creativity
Parkinson disease

ABSTRACT

Impulse control disorder (ICD), including pathological gambling, hypersexuality, and compulsive shopping has been linked to dopaminergic treatment, especially treatment with dopamine agonists (DAs). However, patients with Parkinson's disease (PD) may experience enhanced creativity during DA therapy, often manifesting as newfound artistic pursuits. Though ICD is very well recognized in the literature, enhanced creativity remains underreported, probably because, unlike ICD, enhanced creativity is often positive and rarely disruptive for patients and relatives.

We studied 21 patients (20 patients with PD and one patient with restless-legs syndrome) with enhanced creativity. These individuals engaged in artistic activities after dopaminergic treatment; all but one were treated with DA (pramipexole, 14/21; ropinirole, 4/21; rotigotine 2/21).

Most patients preferred painting as their main activity, but many were engaged in several activities, usually in combination. We hypothesize that by facilitating a stimulating environment for parkinsonian patients, this positive phenomenon may present more frequently.

1. Introduction

Impulse control disorder (ICD) is one of the most frequent and devastating side effects of antiparkinsonian medication. J.A. Molina was the first author to describe gambling as peculiar and typical manifestation of ICD [1]. Over time, it became clear that ICD was a very frequent, highly complex symptom manifesting in patients with Parkinson disease (PD), encompassing abnormal behaviors such as gambling, hypersexuality, compulsive shopping, and eating disorders [2–4]. Now it is also widely accepted that ICD is related to the administration of antiparkinsonian drugs, especially dopamine agonists (DAs) [2–9].

ICD is usually a devastating process, especially in younger patients, but from time to time, some parkinsonian patients remark, often in offhand fashion, that they developed unexpected creative abilities not present before the use of dopaminergic medication [10–14]. We identified a group of PD patients with enhanced creativity related to dopaminergic therapy and analyzed their clinical and artistic features.

2. Patients and methods

We identified patients with PD (and, occasionally, with restless legs syndrome) who, over the last 10 years, developed enhanced creativity after treatment with dopaminergic medication (all but one patient received DAs). In every case, this enhanced creativity was considered positive and never disruptive by the patients and family. All patients received a score of at least 2 points on the creativity item of the Ardouin scale [14–16]. We analyzed the clinical characteristics and the main artistic production of these patients.

The local ethics committee approved this work and participating patients consented to have their artwork appear as part of this study.

3. Results

Most of the PD patients with medication-induced creativity studied (mean age: 66 ± 14; evolution in years: 7.7 ± 3 years) had motor complications, including motor fluctuations (14/20), dyskinesias (12/20), or freezing of gait (6/20). However, all were independent for daily chores and none had significant cognitive impairment.

Table 1 summarizes the main characteristics of the patients. Figs. 1–6 show several examples of the patients' artistic output (including painting and modeling).

Most patients preferred painting as their main creative activity, but many were engaged in several activities, usually in combination.

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https://doi.org/10.1016/j.parkreldis.2019.02.010
Received 19 September 2018; Received in revised form 18 January 2019; Accepted 11 February 2019
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Table 1
Creativity related to dopaminergic drugs.

SUBJECT	AGE/SEX	YEARS	MOTOR COMPL.	LD	DOPAMINE AGONIST	ACTIVITY
1	69/M	10	F,GF,D	+ (+R)	ROP	PAINTING, SCALE MODELS, WOODWORK
2	70/M	8	GF	+ (+R)	PRM	SCALE MODELS (SHIPS
3	74/M	10	F,GF	+	PRM	GARDENING
4	75/M	8	F	+ (+R)	PRM	PAINTING, SCALE MODELS (SHIPS)
5	67/F	3	-	+ (+R)	PRM	PAINTING/DANCE/THEATRE
6	53/F	5	D	+ (+E)	-	PAINTING
7	71/M	5	F, D	+ (+R)	ROT	GARDENING
8	80/M	12	-	+	PRM	CARVING, ENGRAVING
9	60/M	12	F	+ (+R)	PRM	SCALE MODELS (TRAINS) (
10	80/F	8	F,GF	+ (+R)	PRM	PAINTING (> 100)
11	82/F	10	-	-	PRM	PAINTING
12	41/M	6	F,D	+	PRM	MUSIC
13	70/M	3	F,D	+ (+R)	ROP	SCALE MODELS (SHIPS)
14	47/H	5	F,D	+	PRM	TRINKETS, NECKLACES
15	75/M	3	-	+	PRM	PAINTING
16	93/M	12	F,D	+	ROT	PAINTING
17	66/M	5	F,D	+	PRM	NAVIGATION CHARTS
18	75/M	11	F,GF,D	+ (R)	ROP	PAINTING
19	42/M	7	F,GF,D	+(RE)	PRM	PAINTING
20	69/M	10	F,D	+	ROP	WRITING
21	43/M	9	F,D	+	PRM	PAINTING, WRITING, PHOTOGRAPH

MOTOR COMP: MOTOR COMPLICATIONS; F: Fluctuations; GF: Gait freezing D: Dyskinesias LD:Levodopa; ROP Ropinirole; PRA Pramipexole; ROT Rotigotine; R: Rasagiline E: Entecapone

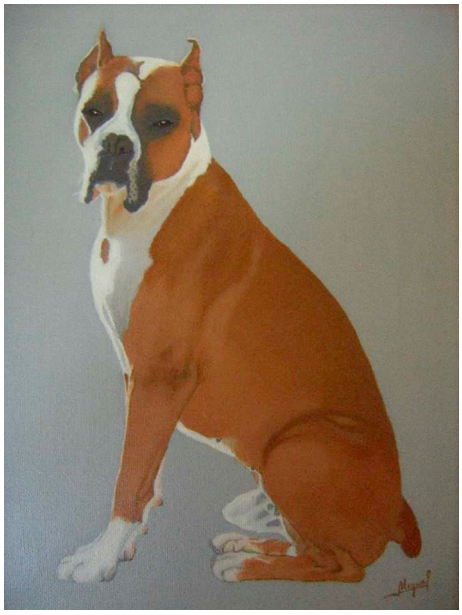

Fig. 1. This patient combined several activities such painting and modeling. This is one of his realistic portrait.

4. Case report

This 75-year-old patient was diagnosed with PD at age 67. His first symptoms included right tremor and bradykinesia. He had an excellent initial response to rasagiline and pramipexole and developed an increased interest in painting and modeling (ship modeling). Although before onset of PD he had been an amateur artist who occasionally engaged in artistic pursuits, his talent seemed to flourish only after he began taking antiparkinsonian medication. Over time his level of artistic productivity increased, and he displayed his paintings at art exhibitions and managed to sell many of his drawings. He never complained of his art as disturbing and although he spent several hours drawing, he remained in control of his personal, family, and social activities without difficulty and his family was pleased with his endeavors. At the time of writing, the patient has not developed abnormal behavior, confusion, or hallucinations.

5. Discussion

In summary, we have detected a group of patients with enhanced creativity related to dopaminergic treatment. Though rare, this phenomenon has been observed previously [10–14]. In their very well-documented article, Lhommée et al. [13] reported on the evolution of artistic production in patients receiving DAs who were candidates for deep brain stimulation (DBS). After DBS, clinically relevant creative behavior persisted in only 1/11 patients, probably due to an important reduction in dopaminergic medication [13].

It is important to note that, in contrast with ICD, enhanced creativity is generally defined as a positive effect, and one that is rarely disruptive for patients and families. Enhanced creativity may be much more frequent than expected, and patients likely do not spontaneously report the presence of this (generally) positive aspect of antiparkinsonian medication.

The mechanism of medication-related enhanced creativity is likely related to dopamine [10–14], as there is a link between enhanced creativity and ICD [11,13,17]. In most cases, DAs are the key medication inducing this effect [10–14,17]. It is interesting to note that pramipexole and ropinirole are the most frequent DAs related to enhanced creativity in our patients, while rotigotine is rarely involved. Of all DAs, pramipexole and ropinirole are also most frequently associated with ICD [7,8]. According to Seeman, DAs with preferential affinity for the D3 receptor are much more likely to be associated with ICD than other less selective agonists, and the relative risk of ICD is generally proportional to D3 affinity [18]; this may be the case with enhanced creativity as well. Finally, it is worth noting that medication-enhanced creativity is not restricted to PD and may also be a rare finding in restless legs syndrome under DA therapy (case 11).

It is unknown why ICD is so frequent while enhanced creativity is

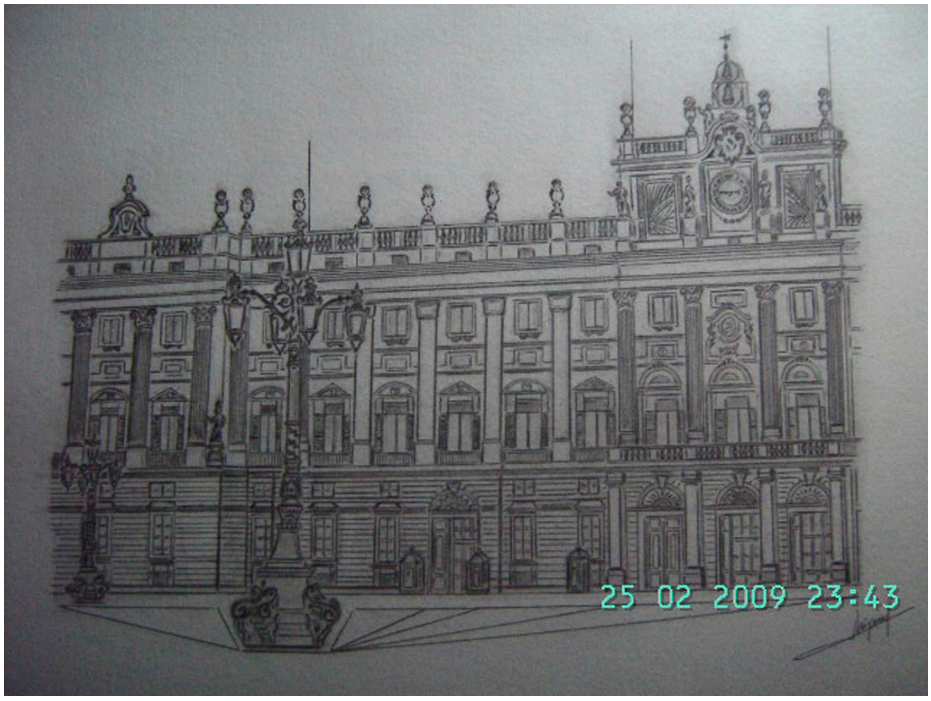

Fig. 2. Occasionally the paintings are highly precise, this is an example of a detailed and minacious building depiction.

Fig. 3. This beautiful Ancient Church Model belongs to the patient 4.

rare. Heightened creative sensibility is likely to be under-reported, though a prospective study would likely help to obtain real figures.

Another interesting question concerns whether the activity of these patients could be described as real "art" or not. In most of our cases, we considered the work of these patients as being artistic based on its beauty and perfection; indeed, some of these patients have already sold their pieces in art galleries. In any case, the definition of art is perennially imprecise. Most of our patients did not have a direct relationship with art before taking DAs, but this point is difficult to confirm; as Canesi pointed out, artistic-like production may mark the emergence of innate skills in a subset of predisposed patients with PD on dopaminergic therapy [11]. It is noteworthy that our patients spent long hours

Fig. 4. Ship modeling: another classic in our patients.

Fig. 5. Very curious micro ship modeling. It is of note the incredible scale of the ships.

with their hobbies, but in contrast with ICD, their families do not complain of their newfound vocation; if the opposite were true, the distinction with ICD would be difficult to establish.

Finally, it is unknown why some PD patients develop ICD and why, under the same medication, others develop enhanced creativity. Our hypothesis is that environment may play some role. On this topic, it is of interest that several of our patients began their artistic production after meeting other subjects already engaged in artistic activities.

We hypothesize that fostering a rich and stimulating environment for patients with PD may contribute to the appearance of this positive phenomenon instead of ICD.

Fig. 6. Laces and trinkets production is another classic in our patients.

Conflicts of interest

Pedro J Garcia Ruiz has received research support from Allergan and UCB, personal compensation as a consultant/scientific advisory board-member from Italfarmaco, Britannia, Bial, and Zambon and speaking honoraria from Italfarmaco, UCB, Zambon, Allergan, and Abbvie.

Juan Carlos Martínez-Castrillo has received honoraria for speaking at meetings sponsored by AbbVie, Allergan, Boehringer, GSK, Krka, Merz, Ipsen, Italfarmaco, Medtronic, TEVA, UCBa and Zambon.

Lydia Vela has received speaking honoraria from UCB, Zambon, and Abbvie.

We appreciate the editorial assistance of Dr. Oliver Shaw.

Funding source

This research did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

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