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Violin playing with flow and improved neurological findings in (atypical) Parkinson's disease

Töres Theorell
Professor, Department of Global Public Health, Karolinska Institutet, Stockholm, and Stress Research Institute, University of Stockholm
tores.theorell@ki.se

Fredrik Ullén
Professor, Department of Cognitive Neuropsychology, Max Planck Institute for Empirical Aesthetics, Frankfurt, and Department of Neuroscience, Karolinska Institutet, Stockholm

Per Svenningsson
Professor, Department of Clinical Neuroscience, Karolinska Institutet, Stockholm

Introduction

Several studies have documented beneficial effects on the neurological state of patients with Parkinson's disease of listening to specially selected rhythmic music. Case reports as well as controlled studies have shown that such music may improve the ability to walk and even dance (Ashoori et al., 2015; Bella et al., 2015; Machado Sotomayor, 2021; Schiavio & Altenmüller, 2015). As far as we know, however, there are no published studies showing effects of instrument playing on the neurological state of patients with Parkinson's disease. In this article, we describe a patient with dramatic improvement in her neurological state after playing the violin.

Case description

A female music journalist born in 1962 was referred to a neurologist in 2009 because a naprapath who treated her observed stiffness and a slight disturbance of her gait in the left leg. Sifrol, (stimulating dopamine), was prescribed. The patient had a crisis reaction with a short period of psychiatric care in 2010 because of the diagnosis. DAT (dopamine transporter) scanning of the brain showed lowered DAT levels in putamen (of importance for the regulation of movements) on the right side of the brain. Azilect, which increases the content of dopamine in relevant brain structures, as well as Stalevo (another dopamine stimulator), were added, but Stalevo had adverse effects (among them weight gain) and was replaced by Sinemet (an alternative to the other medications). She was also prescribed Amantadin, a Glutamate (one of the "signal substances" in the brain) antagonist. When the dosage of this was reduced, there were increased walking problems and problems in general with the left side of the body. In February 2015, a new DAT scanning was performed that showed slight progress since 2009. Magnetic resonance imaging was performed in 2010 and 2015. These showed atrophy (shrinking) of lateral parts of the right temporal lobe with no visible engagement of the insula (which is important for balance). There was a slight worsening between the examinations. The last examination revealed it was unlikely that the degeneration was due to disturbed circulation. The dopaminergic function was decreased in a rather pronounced way on both sides, worse on the right side than on the left.

Neurological state in 2015

No observed disturbance in eye muscle function.

Problems during walking with the left foot. No tremor at rest. No hyperflexibility. Bilateral stiffness in elbows and hand joints, more pronounced on the left side. Reduced diadokokinesia (ability to rapidly perform right and left opposing movements), finger tapping test and "finger game" bilaterally with dominance on the left side. Slightly reduced body posture control in the "pulling test".

In summary, this patient has an atypical Parkinson's disease. From a neurophysiological standpoint her functional disability is compatible with a dopaminergic dysfunction in basal ganglia.

Music as therapy

The patient played the violin as a child but stopped doing so at the age of 20. After the diagnosis of Parkinson's disease she decided to take up her violin playing again, commenting that she would continue this practice "as long as" she "would still be able to play". She took lessons from a well-known Swedish violinist who taught her to play the Summer and the Winter from Antonio Vivaldi's *The Four Seasons*.

She had played the Spring and the Autumn concertos when young, but they are technically easier to play than the other parts. After the lessons she was able to play the difficult parts, albeit in a slow tempo. She also started to play folk music in a group. In both music genres, she noticed that her ability to play was unaffected by the disease despite the fact that the left hand is important in violin playing. Secondly, she noticed that when she felt a "flow" experience while playing, all of the symptoms diminished, and her walking improved dramatically. This could happen both when she played classical music (Mozart and Vivaldi) with her teacher, but also when she played folk music in the group. The experience of flow seems to be an important condition for symptom relief. The experience of flow has been associated with 1) playing together with at least one person and 2) strong rhythmic feelings. One of the authors (TT) joined her, playing violin, in the folk music group, and on this occasion she reported a sudden almost-electrified feeling in her head during playing a piece with strong rhythmic accentuations. After this incident her walking was markedly improved. This improvement lasted for at least 12 hours, which is typical for her experiences. On one occasion the symptom relief lasted for 36 hours. There have been similar experiences while performing classical music. On one occasion, she had a Vivaldi lesson after premedication before her second MRT (Magnetic Resonance Tomography). This premedicated lesson was associated with a strong feeling of flow, and when she returned to the hospital for the examination (which requires almost an hour in a supine position without movements), she had euphoric feelings. The premedication (diazepam) probably amplified the feeling of flow. After this she had a pronounced neurological improvement lasting for many hours.

Her walking before and after playing has been documented in two experiments. Standardized ratings are displayed in Figures 1 and 2. Her walking and neurological state before and after playing during the study were also documented in video recordings that can be ordered from the main author. The experiments were performed in the research lab. One of the authors (TT) was playing folk music with her. The neurologist (PS) who performed the neurological assessments was unaware of which time periods the playing took place during.

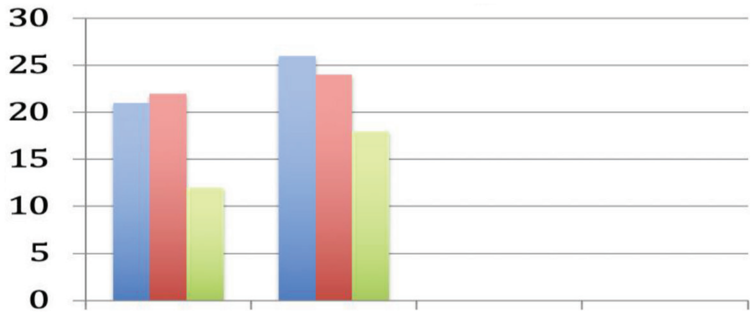

Figure 1. Standardized ratings of neurological status in the patient on two experiment days

Test 1 Dec 12, 2015: Assessment at baseline (blue), after conversation for 30 min (red) and after folk music violin playing with one of the authors for 30 min (green).

Test 2 Jan 22, 2016: Assessment at baseline (blue), after conversation for 45 minutes (red) and after playing for 45 minutes (green).

Figure 1 shows that there was a pronounced improvement of neurological status after playing. The improvement was less pronounced (but still clearly visible) on the second test occasion.

Conclusion

As far as we know, this is the first case in which pronounced improvement in neurological state has been described in conjunction with violin playing in a duet and in a group in an amateur violinist patient with a neurological Parkinson's-like disease. The violin playing has not cured her condition, and a slow mild progress has been observed lately. But the musical activity has provided meaning and quality of life as well as, on many occasions, temporary improvement in her gait.

The patient has signed a consent form to be part of the BioPark study, which was approved by the Regional Ethical Research Board in Stockholm (Dnr. 2011/500-31/1). The patient also approved the text in the present report.

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