



Billiards-related dystonia: A new task-specific dystonia

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ABSTRACT

We report the first videotaped case of focal and task-specific dystonia of the upper limb that occurred exclusively while using a cue during billiard playing. The repetitive movements in conjunction with a highly skilled performance likely contributed to the development of this focal dystonia.

Carambole billiards is a cue sport usually played by two players. Players strike a white ‘cue’ ball in such a way that it hits the two other balls (one white and one red) or one of the balls ends up in the pocket. If this is done successfully, the player scores a carambole, which requires a high level of motor skills and visuospatial abilities. A 57-year-old, right-handed and otherwise healthy man was referred to our outpatient clinic because of abnormal posturing of the right upper limb, which occurred exclusively while playing carambole billiards. Specifically, he noted increased tension and stiffness in his right upper limb, when moving the arm back and forth in a pendulum motion, prior to hitting the white cue ball. This sensation that his arm ‘blocked’ when hitting the ball had been present for approximately 5 years. The patient used a visual trick that consisted of looking at and focusing on his afflicted arm (presumably an attentional strategy), allowing him to release the perceived tightness and better hit the cue ball.

Neurological examination (including writing) was unremarkable. Additionally, voluntary movements contralateral to the affected limb did not provoke dystonic movements in the affected limb (so called “mirror dystonia”). He reported no difficulties during any other activities and there was no previous medical history of movement disorders or other neurological conditions. Relevant observations were made based on a home-made video. This video suggested stiffness of the right upper limb with mild shoulder posturing, persistent anteflexion of the right shoulder and subsequent movement arrest while preparing to hit the cue ball. Elbow flexion was followed by anteflexion and adduction of the right shoulder. Moreover, the movement arrest was overcome

when the patient focused his sight on the afflicted arm. To summarize, the patient experienced excessive tightness and dystonic posturing of his right upper limb, which was task-specific, as it was present exclusively while striking a cue stick. This specific motor act with subsequent activation of involved muscles produced abnormal movements.

Supplementary video related to this article can be found at <https://doi.org/10.1016/j.parkreldis.2018.12.018>.

At this point the differential diagnosis should include (1) task-specific dystonia (TSD), (2) non-task-related dystonia (e.g. focal dystonia), (3) functional movement disorder. This differential diagnosis can be addressed with a careful clinical examination that can yield useful diagnostic clues, such as presence of dystonia in the relevant body part at rest (which would argue against a task-specific dystonia) or presence of dystonia during other tasks (same). Here, a complete neurological examination was unremarkable, which allowed us to exclude non-task specific dystonia (noting that exercise-induced dystonia has sporadically been described as a presenting sign in patients with parkinsonism, but never as a task-specific dystonia) [1]. Functional movement disorders should always be diagnosed based on positive signs, in particular inconsistency (variations in presentation that cannot be readily explained by an underlying neurological disorder, such as presence of entrainment or disappearance of signs with distraction), but these were not present in our case. Spinal cord lesions, which were already unlikely as an explanation for the patient's complaint, were excluded using magnetic resonance imaging. The most likely diagnosis here, based on the clinical history and neurological exam, is therefore a new form of

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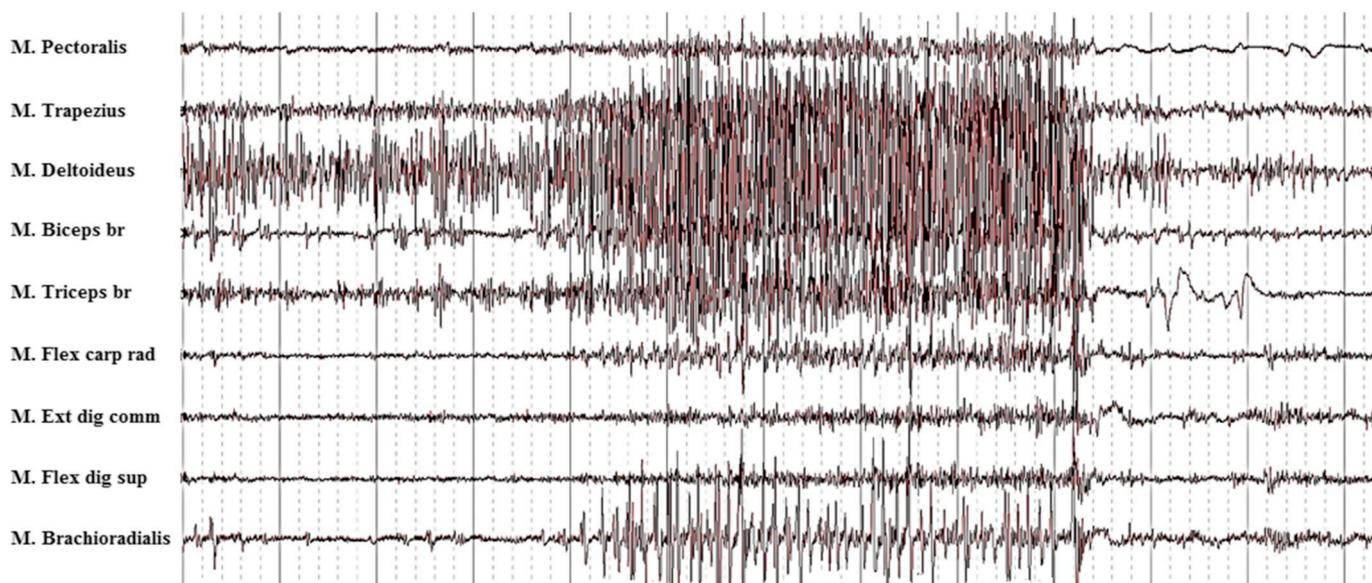


Fig. 1. Polymyography of right upper limb muscles before botulinum toxin injection.

Polymyography shows simultaneous activation of agonist and antagonist muscles of the right upper limb: triceps brachii and biceps brachii. Additionally, excessive activity in the right deltoid and right brachioradial muscles while holding a billiards stick.

task-specific dystonia. We suspect that, just as in other forms of TSD, repetitive, skilled and highly trained movements (related to sport) may ultimately act as a trigger for a focal dystonia, as our case illustrates [2].

Furthermore, neurophysiologic studies were performed with the aim of identifying specific muscles as target for possible botulinum toxin treatment. Typically, polymyography in TSD shows simultaneous activation of agonist and antagonist muscles, overflow of muscles not directly involved on action and excessive contraction [3,4]. Polymyography in our patient showed excessive activity in the triceps brachii, biceps brachii, deltoid and brachioradial muscles on the affected right side while holding a billiards stick (Fig. 1). Polymyography can be helpful in the diagnosis of dystonia, where especially the distinction with functional movement disorders is crucial. Moreover, polymyography allows for the linkage between dystonia and other movements disorders, such as myoclonus and tremor [5].

For treatment of task-specific, focal, dystonia, the gold standard remains the use of Botulinum toxin. Muscles that cause postural deviation can be selected on clinical grounds or, as in this case, with EMG-guided botulinum toxin A (Dysport, Ipsen Ltd., Berkshire, UK). Muscles with severe overactivity were identified and dystonic movement were subsequently differentiated from compensatory movements. Following this, the patient received a total of 120 units distributed between the triceps brachii (20 units), biceps brachii (40 units) and brachioradial (20 units) muscles as well as the flexor carpi radialis muscle (40 units). This was administered in three different sessions with 3-month

intervals. The patient reported an excellent improvement of his symptoms and this improvement persisted throughout the first two sessions for nearly three months after each injection session. The last injection was less effective, but still allowed him to play billiards. The main challenge of botulinum toxin treatment is to provide adequate benefit without loss of function associated with muscle weakness.

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