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LETTER TO THE EDITORS

Localisation of the applause sign in a patient with acute bilateral lenticular infarction

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Dear Sirs,

The 'applause sign' refers to a tendency to initiate an automatic series of hand-claps despite instruction to clap three times only [1]. It is not specific for any one condition, but has been associated with progressive supranuclear palsy (PSP) in particular [2] and has also been described in corticobasal degeneration, multiple system atrophy and idiopathic Parkinson's disease [3]. Localisation of the pathology that gives rise to the applause sign is uncertain. A combination of frontal cortical and basal ganglia dysfunction has been suggested. There has been one previous report of the applause sign in a patient without a known neurodegenerative disease. This occurred in a patient with diffuse B-cell lymphoma involving the putamen on one side; however, there was also extensive subcortical white matter disease bilaterally [4].

A 70-year-old man presented with sudden onset left hemiparesis. He was a diabetic with hypertension and hyperlipidemia. His family reported that he was an active and highly motivated individual who continued to successfully manage a number of businesses. On admission he was found to have atrial fibrillation. There was a mild left facial weakness. Power of shoulder abduction, elbow flexion and finger extension in the left upper limb was 4/5 (MRC scale). Hip flexion was 4/5 in the left lower limb with normal power otherwise. There was mild right more than left upper limb bradykinesia with decrement and mild bilateral rigidity at the wrist with co-activation. No micrographia, rest, postural or action tremor were evident. The left plantar response was extensor. Marked hypomimia and hypophonia were evident. Myerson's sign was present and there was a strong grasp reflex present bilaterally. When asked to copy the examiner by clapping three times only the response was consistently greater than twenty claps. He would not attempt to walk but with encouragement could mobilise with maximal assistance of two people, tending to fall towards his weaker left side.

MRI of brain revealed T2 hyperintensities involving the lentiform nucleus bilaterally, predominantly in the region of the putamen with probable capsular involvement on the right. These lesions were bright on diffusion-weighted imaging (DWI) sequences, consistent with acute infarction (see Fig. 1). A T2 hyperintensity was noted in the head of the caudate on the left without corresponding restriction of diffusion on the DWI sequences. No other acute changes were seen. There was mild generalised cortical atrophy with associated dilatation of the lateral ventricles, including involvement of the frontal lobes on T1 weighted sequences. These changes were felt to be age appropriate.

Over the following 3 months rehabilitation was limited by profound apathy, passivity and low mood. Despite only mild weakness, progress was poor with reluctance to mobilise. Resistance to participation in cognitive testing and poor attention made formal assessment impossible. Slow improvement in spontaneous speech, motivation and mood was observed after treatment with sertraline titrated

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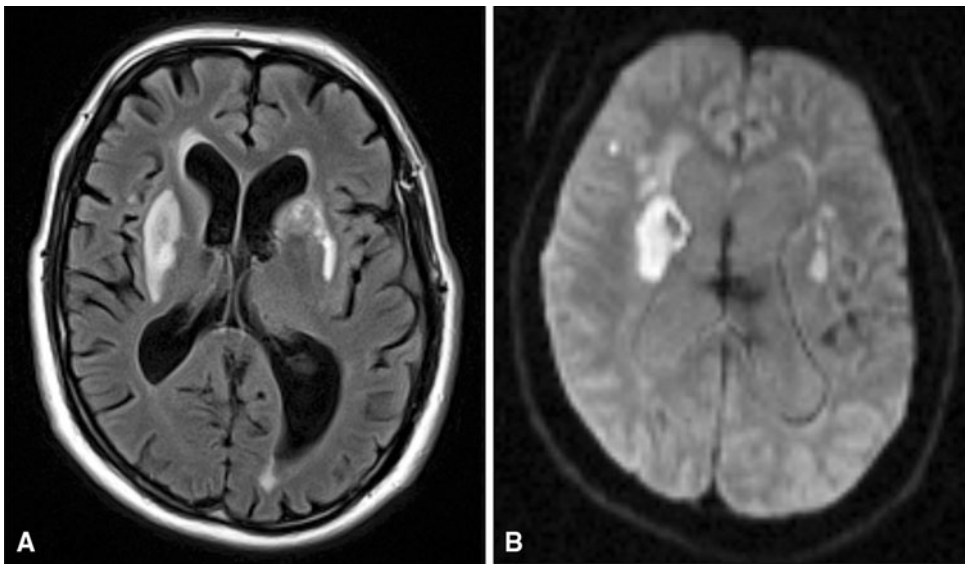

Fig. 1 **a** Axial FLAIR MRI demonstrating hyperintense signal in the left lateral putamen and right putamen with involvement of the internal capsule and juxtacortical white matter. **b** Diffusion-weighted sequence demonstrating restricted diffusion in these regions consistent with acute infarction

to a dose of 100 mg daily. Three months later the applause sign was no longer evident.

Discussion

The behavioural and cognitive consequences of basal ganglia dysfunction have been well described in the literature. Most useful anatomical data comes from case series of focal subcortical lesions [5–7]. With respect to the applause sign, authors have differed in opinion in relation to its likely structural correlate [2, 3]. Dubois and colleagues postulated that both frontal and subcortical involvement is required to disturb the planning of the motor program and the cessation of the automatic routine respectively [2, 8]. The possibility that the applause sign here represents a dyspraxic phenomenon as suggested by Wu and colleagues appears unlikely given the exclusively subcortical location of infarction [3]. This patient's MRI scan did reveal generalised involutional change, including bilateral frontal lobe involvement, and the acute changes have to be interpreted in this context. However, his high level of premorbid functioning, the presence of acute basal ganglia infarction on DWI imaging and the resolution of the applause sign over time make it most likely that the presence of this sign relates to the lenticular infarction as opposed to a pre-existing neurodegenerative disease.

The dramatic apathy, disproportionate to depression, would be in keeping with abulia, described after focal basal ganglia lesions or lesions affecting their connection with the pre-frontal cortex [9]. Other terms such as loss of psychic self-activation and psychic akinesis have been used for the profound lack of drive, motivation and goal directed behaviour most commonly reported in patients with bilateral pallidal lesions [5, 7]. An early PET study in patients with bilateral globus pallidus (GP) lesions demonstrated associated frontal hypometabolism suggesting a 'frontal lobe type syndrome' arising from damage to basal ganglia projections to the prefrontal cortex [10]. Although less common, a behavioural state with a significant apathy component has been reported following bilateral caudate and thalamic lesions [6, 11]. Isolated, bilateral focal putaminal lesions have not been associated with a behavioural syndrome, with extrapyramidal complications being a more common complication [12]. In this case it may be more likely that the apathy noted relates to involvement of the GP.

We postulate that parkinsonism, apathy, frontal release signs and the transient applause sign in this patient are a result of bilateral cardioembolic strokes involving the lentiform nuclei producing a basal ganglia-frontal disconnection syndrome. This case widens the spectrum of pathology associated with the applause sign and provides useful clinico-radiological correlation to inform the discussion relating to its pathophysiological basis.

Conflict of interest None.

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