Impact of DaTscan in the Clinical Evaluation of Patients with Diagnostically Uncertain Parkinsonism

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Abstract

Functional imaging of presynaptic dopamine receptor transporter using DaTscan defines the integrity of the dopaminergic system in the niagrostriatum. It is a valuable diagnostic adjunct to supplement the diagnosis of clinically uncertain Parkinsonism. We conducted a retrospective audit to study the role of DaTscan in the diagnosis and management of patients with clinically uncertain Parkinsonism.

Methods

Case notes of patients who underwent DaTscan over a period of two years (April 2009 - April 2011) were reviewed. We looked at indications for DaTscan, any change in diagnosis and management following DaTscan and complications related to it.

Results

62 patients had DaTscan. Majority was elderly male 88.7% patients were referred from neurology clinics. Commonest indication (77.5%) of DaTscan was to confirm or exclude a diagnosis of Parkinson's disease. DaTscan was abnormal in 60% cases. In 59.6% cases DaTscan confirmed the pre-DaTscan diagnosis and in 35.4% cases the diagnosis was changed following the scan. DaTscan led to change in treatment in 62.9% cases. No complications related to DaTscan noted.

Conclusion

DaTscan proves to be an important objective tool in the clinical evaluation of diagnostically uncertain Parkinsonism and rationalizes the appropriate management. It seems to be an underutilised tool in elderly medicine.

Introduction

Many conditions mimic Parkinson's disease (PD), making its diagnosis difficult particularly in the earlier stages with subtle clinical signs and symptoms. Diagnosis of Parkinsonism is mostly clinical relying on subjective assessments and is open to error. Common causes of misdiagnosis are Essential Tremor (ET), drug induced Parkinsonism and vascular Parkinsonism. Early accurate diagnosis is the key to the effective long term management of Parkinsonism[1]. Misdiagnosis of nonparkinsonian syndrome as Parkinson's disease has prognostic and therapeutic implications such as adverse drug effect and medication cost[2]. Moreover delay in making an accurate diagnosis can cause psychological stress for the patient and their carer[3]. DaTscan is considered to be a valuable diagnostic adjunct to supplement clinical findings in evaluating clinically uncertain Parkinsonian syndrome[4] with overlapping, incomplete and inconclusive clinical features. We studied the role of DaTscan in the diagnosis and management of patients with clinically uncertain Parkinsonism in our clinical practice.

DaTscan- Ioflupane (^{123}I), a radio-tracer (trade name DaTscan) which selectively binds with presynaptic Dopamine Transporter (DaT) in the niagrostriatum, detected by SPECT (Single-Photon Emission Computed Tomography) scan thus acts as a functional biomarker. It uniquely detects loss of functional dopaminergic neuron terminals in the striatum, thus reliably differentiate between neurodegenerative Parkinsonian syndrome (such as idiopathic PD, Multi System Atrophy, Progressive Supranuclear Palsy and Cortico Basal Degeneration) and

non-neurodegerative disorders (such as essential tremor, drug induced Parkinsonism, psychogenic tremor and vascular Parkinsonism)[5]. DaTscan also has been used to differentiate Dementia with Lewy Body (DLB) with an abnormal scan from Alzheimer's disease[2]. The consistent accuracy of DaTscan is confirmed by almost 100% specificity[6,7]. However it is unable to differentiate between PD and atypical Parkinsonian syndrome (Multi System Atrophy, Progressive Supranuclear Palsy and Cortico Basal Degeneration) and between PD dementia and DLB.

NICE recommends SPECT should be considered for people with tremor where essential tremor cannot be clinically differentiated from Parkinsonism[3].

DaTscan is usually well tolerated. In clinical trials headache, nausea, dizziness, vertigo, dry mouth of mild to moderate severity were reported and in post-marketing experience hypersensitivity reaction, injection site pain have been reported[8].

Objectives

We conducted a retrospective audit to see:

- the role of DaTscan in evaluating the patients with features of Parkinsonism with uncertain diagnosis.
- the indications of requesting DaTscan and its appropriateness.
- any change in the diagnosis and management following DaTscan.
- any complications related to DaTscan.

Material and method

We conducted a retrospective audit with case notes review in Hull and East Yorkshire Hospitals NHS Trust. Details of patients who underwent DaTscan over a period of 2 years (April 2009 - April 2011) were obtained from Department of Nuclear Medicine on a password protected hospital database. All data was collected and analysed by a single auditor.

Terminology

Parkinsonian syndrome (PS): Idiopathic PD or PD, Multi System Atrophy (MSA), Progressive Supranuclear Palsy (PSP) and Cortico Basal Degeneration (CBD). The last three are often termed as Atypical Parkinsonian Syndrome. Non-Parkinsonian Syndrome or Non PS: Essential tremor, drug induced Parkinsonism, psychogenic tremor and vascular Parkinsonism.

Results

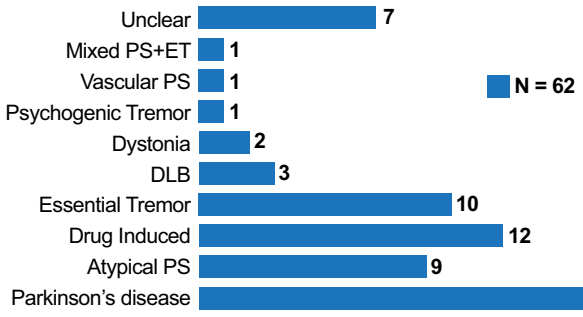
A total of 62 patients had DaTscan over this period and majority were male (39%, 62.9%) and elderly between 60-80 years (64.5%). Main source of referral was neurology out-patient clinics (55, 88.7%), followed by elderly medicine out-patient clinics (3, 4.3%) and elderly medicine in-patient (2, 3.2%).Nearly all patients (98.3%) had one or other features of Parkinsonism. Tremor was the commonest symptoms in 42 (67.7%) and resting tremor was the commonest type (52.3%). Commonest indication for DaTscan was to confirm or exclude a diagnosis of PD in 75.8% (47/62). Other indications were to change for medications in 17.7% (11/62) and to reassure the patient/relative the need for therapy or otherwise in 6.4% (4/62).

DaTscan was inappropriately requested in 5 patients (8.0%) mainly to differentiate between PD and atypical PS or PD and DLB. DaTscan was abnormal in 37/62(59.6%) cases.

Results: Outcome on diagnosis:-

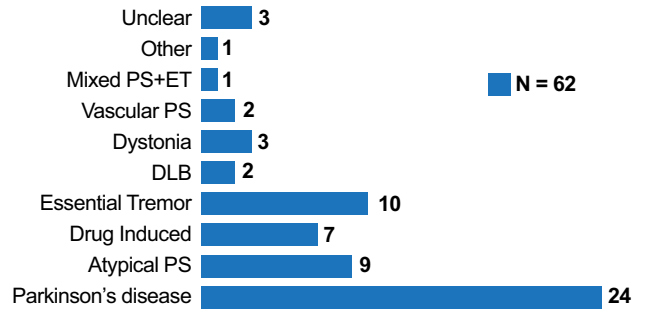
DaTscan confirms the pre-scan diagnosis (Figure 1) in 37(59.6%) and changed the pre-scan diagnosis in 22 (35.4%) cases (Figure 2). There was an increase in the diagnosis of PS by 12.9% following DaTscan.

Figure 1: Bar Diagram shows pre-DaTscan Diagnosis in 62 Patients



PS: Parkinson Syndrome, ET: Essential Tremor, DLB: Dementia with Lewy Bodies

Figure 2: Bar Diagram shows post-DaTscan Diagnosis in 62 Patients



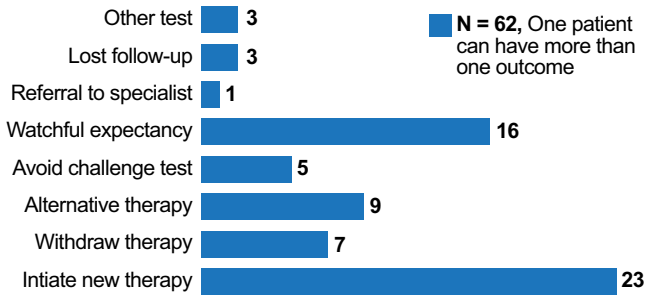
PS: Parkinson Syndrome, ET: Essential Tremor, DLB: Dementia with Lewy Bodies

Diagnosis remains inconclusive in 3 (4.8%) of which 2 patients underwent repeat DaTscan- with no change in results.

Results: Outcome of management following DaTscan:-

There was change in management in 39 (62.9%) following the scan (figure 3) Complications: there was no documentation of any major or minor side effects related to

Figure 3: Bar Diagram shows outcome of management patients following DaTscan



DaTscan noted in our study.

Conclusions of DaTscan from this small audit are it:

- is an important objective tool in the clinical evaluation of diagnostically uncertain Parkinsonism and tremor of uncertain origin.
- confirmed the initial clinical diagnosis in nearly 60% cases and changed pre-scan diagnosis in 35%.
- had an significant impact on the management decision with a change in management in 63% cases.
- appeared to be well tolerated with no reported side effects.
- appeared to be an under-utilised diagnostic tool in elderly medicine.

Practice points

- Clinical diagnosis of Parkinsonism is often straightforward obviating the need for any additional test. However in presence of overlapping and inconclusive syndrome, use of DaTscan could be useful in improving diagnostic accuracy. It helps to supplement the clinical findings in diagnostically uncertain Parkinsonism and hence rationalise appropriate management.
- It has a significant impact on the management decision and thus helps to avoid unnecessary exposure to anti-Parkinsonian medications, adverse drug effect and medication cost.
- This study aims to improve the awareness of use of DaTscan imaging amongst the physicians particularly in elderly medicine where it seems to be underutilised.

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Glossary

DaTscan - Ioflupane (123I), a radio-tracer, which selectively binds with presynpatic Dopamine Transporter (DaT) in the niagrostriatum, detected by SPECT scan thus acts as a functional biomarker. It detects the integrity of functional dopaminergic system in niagrostriatum.

Parkinsonism - is a neurological syndrome characterised by tremor, rigidity, bradykinesia and postural instability.