The main clinical applications of DaTSCAN

Appraised by Kevin Galbraith, 7 February 2016

Update due 2019

Clinical question

What are the main clinical applications of DaTSCAN in the diagnosis of Parkinson's and related disorders?

Background

Parkinson's can be difficult to differentiate from other parkinsonian syndromes or essential tremor. DaTSCAN measures the density of nigrostriatial dopamine transporter sites. It has been approved by the European Medicines Agency, and the US Food and Drug Administration. This CAT looks at the evidence contributing to our understanding of the clinical applications of DaTSCAN as a tool in the diagnosis of Parkinson's and related disorders.

Clinical bottom line

1. DaTSCAN is indicated when clinical diagnostic uncertainty exists about the presence of dopamine deficiency as the cause of parkinsonism or tremor. This may arise when the clinical picture is incomplete, or there are pointers to a possible alternative diagnosis, or dual pathology may be present.[1]

2. In uncomplicated cases, in which the symptoms and examination findings fit criteria for Parkinson's, a DaTSCAN is not indicated.

Search terms

Nervous System Diseases / [Radionuclide imaging] AND (Tomography, Emission-Computed, Single-Photon / OR DaTSCAN OR dopaminergic imaging OR FP-CIT OR ioflupane OR Tropanes / [Diagnostic Use] OR tropanes) AND (indication$ OR application$ OR algorithm).

Search strategy

Ovid Medline, adapted for Embase and Cochrane Library. A search for guidelines was conducted using the US National Guideline Clearinghouse. All searches were from 1996 to February 2016. This yielded five relevant articles (all narrative reviews) and three relevant guidelines. The most recent guideline was regarded as the most likely source of best evidence, and was selected for critical appraisal.[2]

Evidence

A guideline published in 2013 provided recommendations for the clinical application of DaTSCAN in diagnosis of Parkinson's and related disorders

Van Laere K, Everaert L, Annemans L, Gonce M, Vandenberghe W, Vander Borght T. The cost effectiveness of 123I-FP-CIT SPECT imaging in patients with an uncertain clinical diagnosis of parkinsonism. European Journal of Nuclear Medicine and Molecular Imaging. 2008;35(7):1367-76.

Summary

This European Federation of Neurological Societies/ Movement Disorder Society – European Section (EFNS/MDS-ES) Task Force report addressed key aspects of the diagnostic approach to patients presenting with parkinsonism. It concluded that DaTSCAN can be recommended for use in the differential diagnosis of essential tremor from Parkinson's and atypical parkinsonism. It stated: "More specifically, DaTSCAN SPECT is indicated in the presence of significant clinical uncertainty and particularly in patients presenting atypical tremor manifestations." Using the EFNS Evidence Classification Scheme, this recommendation is graded as Level A (effective).

The guideline followed an EFNS protocol for guideline development.[3] The protocol was consulted to provide detail on the methods. The guideline was critically appraised using the AGREE II instrument.[4] Points were noted and scores calculated (between zero and 100%) for each domain as follows:

- **Scope and purpose**: The overall objectives were well described in the guideline development protocol. The specific questions addressed by the guideline were also clear. The population to whom the guideline applies was implicit in the title and from the abstract – no further detail was given. **Score 89%**.

- **Stakeholder involvement**: The composition of the guideline development group, patient representation and target users were described in general terms in the guideline development protocol. No specific information was given for this specific guideline. **Score 72%**.

- **Rigour of development**: Detail on the search strategy was given in the guideline development protocol. Appropriate bibliographic databases were stipulated, and strategies were described for finding unpublished studies. No information was available for this specific guideline. The criteria for selecting evidence were unclear, though the guideline did employ classification and grading of evidence, as stipulated in the guideline development protocol. The strengths and limitations of the selected evidence were not clearly described. The methods for formulating

recommendations were given in the guideline development protocol. The health benefits, side effects and risks were considered in some sections of the guideline, but the section relating to use of DaTSCAN did not list any potential side effects or risks. Evidence was clearly linked to each recommendation. The policy was in place for external review, but was not explicitly described for this particular guideline. A procedure for review and update was provided in the guideline development protocol. **Score 62.5%**.

- **Clarity of presentation**: The recommendations pertaining to DaTSCAN could have been presented more clearly. A number of management options were embedded within paragraphs, and were not visibly highlighted. Key recommendations were easily identified however, with a separate paragraph for each. **Score 72%**.

- **Applicability**: No description was given of potential facilitators and barriers to the application of the guideline. Neither were there advice or tools to help put it into practice. Potential resource implications were not considered. No monitoring or auditing criteria were suggested. **Score zero**.

- **Editorial independence**: No external funding was evident. Competing interests of the guideline development group were neither recorded nor addressed. **Score 25%**.

- **Overall, the guideline was rated as of moderate quality. The most important limitation was a lack of detail pertaining to the searching for, and criteria for selection of, evidence underpinning the recommendations.**

In view of this limitation, the recommendations were compared with those published by the Scottish Intercollegiate Guideline Network (SIGN) on the diagnosis and drug management of Parkinson's disease (2010).[5] This states: "123I-FP-CIT SPECT scanning should be considered as an aid to clinical diagnosis in patients where there is uncertainty between Parkinson's disease and non-degenerative parkinsonism/tremor disorders." The recommendation is assigned a grade B (see www.sign.ac.uk for detailed clarification).

The SIGN recommendation is well articulated in a summary published in the British Medical Journal: **"When the clinical picture is incomplete, or there are pointers to a possible alternative diagnosis, or dual pathology may be present, the following diagnostic test(s) may be applied: perform an FP-CIT-SPECT brain scan when clinical diagnostic uncertainty exists about the presence of dopamine deficiency as the cause of parkinsonism or tremor."**[1]

This concurs with the recommendation of the EFNS/MDS-ES Task Force report, but is arguably more clearly and usefully articulated. It is therefore presented in this CAT as the clinical bottom line.

References

1. Grosset D, Macphee G, Nairn M. GUIDELINES: Diagnosis and pharmacological management of Parkinson's disease: summary of SIGN guidelines. BMJ: British Medical Journal. 2010;340(7739):206-9.

2. Berardelli A, Wenning G, Antonini A, Berg D, Bloem B, Bonifati V, et al. EFNS/MDS-ES recommendations for the diagnosis of Parkinson's disease. European journal of neurology. 2013;20(1):16-34.

3. Brainin M, Barnes M, Baron JC, Gilhus NE, Hughes R, Selmaj K, et al. Guidance for the preparation of neurological management guidelines by EFNS scientific task forces--revised recommendations 2004. Eur J Neurol. 2004;11(9):577-81.

4. Brouwers MC, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, et al. AGREE II: advancing guideline development, reporting and evaluation in health care. Canadian Medical Association Journal. 2010;182(18):E839-E42.

5. Scottish Intercollegiate Guidelines Network. Diagnosis and pharmacological management of Parkinson's disease. SIGN 2010 (SIGN publication No. 113) Edinburgh [Available from: http://www.sign.ac.uk/ guidelines/fulltext/113/index.html. [accessed 19 April 2017]

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