Six-item Cognitive Impairment Test: suitable for the visually impaired?

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Unsurprisingly, visually impaired individuals perform worse than controls on MMSE items requiring vision. The issue of meaningful cognitive assessment in visually impaired individuals may become of increasing importance due to an association between cognitive decline and visual loss. Dr Larner reports on the effectiveness of using the Six-item Cognitive Impairment Test (6CIT) in visually impaired patients and examines its potential use in settings such as primary care and old age psychiatry memory clinics.

Many commonly used cognitive screening instruments contain visually-mediated tasks or items which require visual recognition of material, including the Mini Mental State Examination (MMSE), the Clock Drawing Test (CDT), the Montreal Cognitive Assessment (MoCA), and the various iterations of the Addenbrooke's Cognitive Examination (ACE, ACE-R, ACE-III, M-ACE). Their use is therefore problematic for cognitive assessment in visually impaired individuals. Unsurprisingly, visually impaired individuals perform worse than controls on MMSE items requiring vision and on CDT.[1]

This issue may become increasingly important as there may be an association between cognitive decline and visual loss, for example due to cataract, in older people.[2] A short cognitive screening instrument acceptable for use in visually impaired persons would therefore be desirable.

One option to address this need may be the Six-item Cognitive Impairment Test (6CIT},[3] since its component tests are entirely verbally mediated. 6CIT has been shown to have good metrics for identifying cognitive impairment in consecutive referrals to a dedicated cognitive disorders clinic based in a regional neuroscience centre.[4,5]

Task	Domain	Score for incorrect answer
State the year	Orientation	4
State the month	Orientation	3
Recall of 5-component name and address	Memory	2 points per error (max 10)
State the time	Orientation	3
Count backwards from 20	Calculation	2 points for 1 error, 4 points for >1 error
Name months in reverse	Calculation	2 points for 1 error, 4 points for >1 error

Scoring: 6CIT scores are classified to aid test interpretation eg:
'normal cognition' (0–4)
'questionable impairment' (5–9)
'suggesting impairment consistent with dementia and requiring further evaluation' (10 or more).
Other sources (www.patient.co.uk/doctor/six-item-cognitive-impairment-test-6cit) consider scores of 0–7 normal and ≥8 significant.

Table 1. Item content and scoring of 6CIT (NB: negative scoring, ie higher score = worse performance; maximum score/worst performance = 28)

The aim of this study is to report experience of using the 6CIT in patients with visual impairment presenting to a neurology-led cognitive disorders clinic.

Materials and methods

Patients with visual impairment referred to a dedicated cognitive disorders clinic were administered the 6CIT (see Table 1). This instrument comprises six vision-independent cognitive tests examining orientation in time, calculation and memory (delayed recall of a five-item name and address).[3] Unlike most other cognitive screening instruments, 6CIT is negatively scored (*ie* higher scores indicate worse performance). 6CIT scores (range 0–28) have a high (negative) correlation with MMSE scores.[4]

Reference standard for diagnosis of cognitive problems in these patients was judgment of an experienced clinician based on patient and collateral history and

structural brain imaging, but blind to patient 6CIT score, and applying widely accepted diagnostic criteria for dementia (DSM-IV) and its subtypes and for mild cognitive impairment (Petersen criteria).[4]

Results

Case 1

A 59 year-old woman with the syndrome of neurogenic weakness, ataxia, and retinitis pigmentosa, or NARP, a mitochondrial disorder most commonly resulting from a point mutation at base pair 8993 of the mitochondrial genome in the ATPase 6 gene, was referred with episodic confusion reported by family members and friends. The diagnosis of NARP had been made some 20 years earlier. The patient's vision had progressively deteriorated and she was registered blind at age 53 years. She was confirmed to harbour the m.8993T>G mutation in the mitochondrial genome, with heteroplasmy (58% mutant DNA in blood).[6]

Because of her visual impairment, cognitive assessment with commonly used screening instruments was not possible, and hence the 6CIT was administered. On this she scored 4/28, which may be interpreted either as normal or at the upper limit of the normal range (see Table 1 for scoring and interpretations). Magnetic resonance (MR) imaging of the brain was normal with no evidence of atrophy or cerebrovascular disease.[6]

Case 2

A woman with a syndrome of paroxysmal exercise-induced dystonia (PEID) and optic atrophy diagnosed in childhood was referred in her mid-thirties because of her personal concerns about her memory function. From the age of 18 months, she had developed episodes of painless flaccid limb weakness after exercise, accompanied with bending truncal movements and dystonic hand movements lasting for hours. By age 30 years these episodes had become infrequent, but she had developed upper limb intention tremor and head tremor, which showed some response to treatment with levodopa. From age five years, bilateral optic atrophy and pendular nystagmus had developed. She was registered blind at the age of 11 years.[7] Genetic testing showed no pathogenic sequence variant or copy number change in the SLC2A1 gene, hence there was no evidence for GLUT1 deficiency,[8] which has been found in some cases of PEID.

Because of her visual impairment, cognitive screening using the 6CIT was undertaken, on which she scored 0/28 (normal). MR brain imaging was normal with no evidence of atrophy or cerebrovascular disease.[8]

Case 3

Around the age of 20 years this patient developed visual impairment as a consequence of bilateral viral retinitis and was subsequently found to have a rare congenital immunodeficiency syndrome, purine nucleoside phosphorylase (PNP) deficiency.[9] Two years later there was further decline in the visual acuity (Right <6/24, Left counting fingers) which prompted MR brain imaging. This showed a focal right temporal lobe high signal lesion without mass effect but with contrast enhancement. MR spectroscopy of the lesion showed elevated choline levels with decreased N-acetyl aspartate, changes thought to be compatible with neoplasia, possibly lymphoma.

The patient was reported to be increasingly dependent on other family members for recall of hospital appointments, prompting concerns about memory, although the patient denied any memory symptoms. 6CIT was administered, with a score of 0/28 (normal). Cerebrospinal fluid (CSF) polymerase chain reaction was negative for a variety of viruses (enterovirus, parechovirus, varicella zoster, Epstein-Barr, herpes simplex, JC virus) and CSF cryptococcal antigen was negative. Brain biopsy showed non-specific chronic inflammation and reactive changes with no evidence of tumour.

Discussion

Modifications to commonly used cognitive screening instruments to make them suitable for use with visually impaired patients are available, such as the 'MMSE-blind'[10] or 'MMblind'[11] and the MoCA-Blind (www.mocatest.org). MoCA has been re-analysed without its five visual items and reported to have excellent specificity but reduced sensitivity for identifying cognitive impairment compared to the full MoCA.[12]

In the cases reported here, 6CIT proved acceptable to visually impaired patients and was quick and relatively easy to use. Admittedly, the causes of visual impairment reported here are unusual, and the patients relatively young, as is anticipated in the case mix of a dedicated neurological cognitive disorders clinic, and without evidence of cognitive impairment. Nevertheless, these examples suggest that 6CIT might be of use for cognitive screening in patients with visual impairment. The normal results on 6CIT scoring do not entirely exclude subtle cognitive impairments, but the test is sensitive for cognitive impairment (>0.85) at both of the suggested cut-offs (see Table 1).[4,5]

There is currently little information available on the use of 6CIT in the context of visual impairment. One study used it

simply to exclude patients with cognitive impairment.[13]

In conclusion, 6CIT is quick, easy to use, and acceptable to patients with visual impairment who are suspected to have cognitive impairment. Moreover, it is freely available (www.patient.co.uk/doctor/six-item-cognitive-impairment-test-6cit). Certainly 6CIT is being increasingly used in primary care settings,[14] perhaps as a consequence of national directives to improve the identification of patients with dementia. It would be of interest to assess 6CIT's utility as a cognitive screener in the context of older persons with visual impairment, for example in old age psychiatry memory clinics.

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Declaration of interests

No conflicts of interest were declared.

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POEMs

ESSENTIAL EVIDENCE PLUS

Dextromethorphan-quinidine may reduce agitation in adults with Alzheimer disease

Clinical question

Is the combination of dextromethorphan-quinidine useful in the management of agitation in adults with Alzheimer disease dementia?

Reference

Cummings JL, Lyketsos CG, Peskind ER, et al. Effect of dextromethorphan-quinidine on agitation in patients with Alzheimer disease dementia. A randomized clinical trial. JAMA 2015;314(12):1242-1254.

Synopsis

Investigators identified adults (N = 220), aged 50 to 90 years, meeting standard diagnostic criteria for probable Alzheimer disease and clinically significant agitation. In the first stage of the trial, patients randomly received oral dextromethorphan-quinidine (20/10 mg in the morning [with a placebo pill in the evening for masking] during week 1; then 20/10 mg, morning and evening, for weeks 2 and 3; and finally 30/10 mg, morning and evening, for weeks 4 and 5) or matching placebo. In stage 2, patients who initially received dextromethorphan-quinidine continued to do so while patients who initially received placebo were re-randomized to receive dextromethorphan-quinidine or matching placebo. Individuals masked to treatment group assignment assessed outcomes using multiple prevalidated scoring tools for assessing Alzheimer disease agitation/aggression domains, quality of life, and caregiver distress and stress. Complete follow-up occurred for 88.2% of patients at 10 weeks. Using modified intention-to-treat analysis, mean scores after stage 1 on the primary agitation/aggression assessment tool were significantly reduced in the dextromethorphan-quinidine group compared with the placebo group (7.1 to 3.8 and 7.0 to 5.3, respectively). A similarly significant mean reduction of -1.6 favoring the treatment group occurred after stage 2. No significant differences were noted in quality of life or Alzheimer disease scores.