

The Importance of the Clock Drawing Test in Palliative Care: Identifying Cognitive Impairment and the Reverse Clock Drawing Test Phenomenon

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Abstract

Delirium is common in palliative care and often not diagnosed or mistaken for sedation or anxiety. There are multiple validated screening tools. The clock drawing test (CDT) is a rapid and patient centered screen for delirium which can be followed longitudinally. It also has the possibility of detecting the underlying neuroanatomical lesion. We present a patient with a right hemispheric subdural hematoma who had a reversal of the numbers on the clock face. This has been described with pathology of the right hemisphere. This patient experience illustrates the benefits of the CDT not only in detecting delirium but also revealing the neuroanatomical locus which generated the delirium episode and assisted the palliative care team in identifying patients with appropriate decision-making capacity.

Keywords: Clock Drawing Test; Palliative Care

Introduction

The impact of delirium in palliative medicine is increasing because of the number of patients with comorbidities and assessment complexity due to diverse presenting characteristics [1]. Thirty percent of hospitalized patients and 51% of postsurgical patients develop delirium during a hospital stay. In addition, 25-85% of patients with advanced illnesses during their last weeks of life will have terminal delirium [2,3]. Unfortunately, an accurate understanding of its prevalence and incidence is hindered by the fact that delirium remains underdiagnosed [4]. Reasons that can explain its underdiagnosis or rather, misdiagnosis include similar clinical presentations. For example, hypoactive delirium is often mistaken for depression while hyperactive delirium is confused with anxiety.

Fortunately, several screening tools exist and have been validated for the assessment of delirium. These include the Memorial Delirium Assessment Scale (MDAS), the Confusion Assessment Method (CAM), and the Delirium Rating Scale (DRS) [5]. The consistent use of these tools has the potential to diagnose delirium earlier and thus reduce associated morbidity by reversing the cause for delirium.

The Clock Drawing Test (CDT) is one cognitive screening tool that was used in the following case report [6-8]. The associated benefits of the CDT are that it is a quick bedside screen which can be used in non-verbal patients, is a patient-completed assessment which can be objectively followed over time as well as evaluate a wide range of cognitive functions. The core instruction of the test is to inform the patient to draw the numbers on a clock face and to draw the hands of a clock to show a fixed time. It is important to note that various scoring systems exist although not one appeared to have a superior predictive validity over the other. In addition, no prior expertise is needed to carry out this screening test. Its simplicity relies on the patient to be able to demonstrate correct and even spacing of the numbers along with the correct placement of the hands of the clock. In doing so, clock drawing assesses memory reconstruction, visual perceptual analysis, motor execution, attention, language comprehension and numerical knowledge.

The following case report describes the use of the CDT by the palliative service for goals of care discussion and demonstrated a unique finding related to the underlying cause of neurological decline. Consequently, the objective was to demonstrate how the CDT can be used to evaluate appropriate patients who have questionable decision-making capacity. Finally, based on an unexpected result, another objective was to interpret and explain the underlying pathology.

with the findings in our patient given that his subdural hemorrhage occurred along the right cerebral convexity. In another medical report, however, Brugnolo *et al* demonstrated that reversal of the numbers on the CDT did not only occur in stroke patients but in varying cognitive disorders such as Alzheimer's dementia, vascular dementia, fronto-temporal dementia and Lewy body dementia [10]. They were also able to determine a peculiar pattern of brain dysfunction in nine patients with Alzheimer's dementia by brain perfusion SPECT which was associated with the reversal of numbers. Their findings showed that fronto-temporal dysfunction, particularly of the right hemisphere, played a role in reversed CDT [11]. The reversal of numbers on the CDT was also demonstrated in a case report of two delirious patients in the acute care palliative unit by Zama, Maynard and Davis, in which after responding to antipsychotics and opioid rotation, a normalization of the CDT was achieved [12]. This unique finding demonstrates the value of the CDT in identifying delirium, which is vital in palliative medicine and the possibility of uncovering the neuro anatomical pathology [13-16].

There are drawbacks to delirium screening tools. Cognitive impairment is an umbrella term for disorders of thinking, concentrating, reasoning, remembering and formulating ideas and it includes but is not confined to disorders such as delirium [17]. Few studies that have evaluated delirium using the CDT have produced inconsistent results. A study by Bryson *et al* concluded it was a poor screening tool in a population at high risk for postoperative cognitive disorder [18]. Adamis *et al* also attempted to address this and concluded that the CDT was good for screening cognitive impairment, but not optimal for detection of delirium in elderly medical patients with the hallmark being waxing and waning sensorium and inattention [19].

Each screening tool has its own limitations. The limitations of the CDT are as follows: its use is determined by ease and familiarity of the user as well as different scoring methodology. Mendes-Santos *et al* reported a wide variety of CDTs each relying on different systems of administrations and quantitative and qualitative scoring with no consensus on which system produces the most valid results [20]. Other potential limitations include its lack of utility in those patients with visual impairment or neurological difficulties such as paralysis and tremor. Some physicians have expressed concerns of bias from age and education though this is disputed by others. Yet, positive features are that it is not affected by mood, language, and culture as well as its brevity and high negative predictive value (0.95-0.73) [21-23]. However, this was largely done in patients with early dementia or psychosis which may not be applicable to delirium.

In summary, the CDT remains a quick and efficient screening tool that is very useful in palliative medicine, particularly when decision-making capacity is potentially compromised. In this case, we were able to demonstrate a unique and rare instance of reversed CDT, that is explained by a right subdural hemorrhage. This finding would warrant further exploration in a larger, representative sample.

References

- Vidal EI, Villas Boas PJ, Valle AP, Cerqueira AT, Fukushima FB (2013) Delirium in older adults. *BMJ* 346: f2031.
- Mercadante S, Adile C, Ferrera P, Cortegiani A, Casuccio A (2017) Delirium assessed by Memorial Delirium Assessment Scale in advanced cancer patients admitted to an acute palliative supportive care unit. *Curr Med Res Opin* 33(7): 1303-8.
- Senel G, Uysal N, Oguz G, Kaya M, Kadioullari N, et al. (2017) Delirium Frequency and Risk Factors Among Patients With Cancer in Palliative Care Unit. *Am J Hosp Palliat Care* 34: 282-6.
- Setters B, Solberg LM (2017) Delirium. *Prim Care* 44: 541-59.
- Adamis D, Meagher D, Rooney S, Mulligan O, McCarthy G (2018) A comparison of outcomes according to different diagnostic systems for delirium (DSM-5, DSM-IV, CAM, and DRS-R98). *Int Psychogeriatrics* 591-6.
- Palsetia D, Rao GP, Tiwari SC, Lodha P, De Sousa A (2018) The Clock Drawing Test versus Mini-mental Status Examination as a Screening Tool for Dementia: A Clinical Comparison. *Indian J Psychol Med* 40: 1-10.
- Henderson M, Scott S, Hotopf M (2007) Use of the clock-drawing test in a hospice population. *Palliat Med* 21: 559-65.
- Rakusa M, Jensterle J, Mlakar J (2018) Clock Drawing Test: A Simple Scoring System for the Accurate Screening of Cognitive Impairment in Patients with Mild Cognitive Impairment and Dementia. *Dement Geriatr Cogn Disord* 45: 326-34.
- Kumral E, Evyapan D (2000) Reversed clock phenomenon: A right-hemisphere syndrome. *Neurol* 55: 151-2.
- Brugnolo A, Morbelli S, Dessi B, N Girtler, D Mazzei, et al. (2010) The reversed clock drawing test phenomenon in Alzheimer's disease: A perfusion SPECT study. *Dementia and geriatric cognitive disorders* 29: 1-10.
- Orssaud C, Halimi P, Le Jeune C, Dufier JL (2005) Persisting reversed clock syndrome. *Behav Neurol* 16: 233-6.
- Zama IN, Maynard WK, Davis MP (2008) Clocking delirium: the value of the Clock Drawing Test with case illustrations. *Am J Hosp Palliat Care* 25: 385-8.
- De Guise E, LeBlanc J, Gosselin N, Marcoux J, Champoux MC, et al. (2010) Neuroanatomical correlates of the clock drawing test in patients with traumatic brain injury. *Brain Inj* 24: 1568-74.
- Klinke ME, Hjaltason H, Tryggvadottir GB, Jonsdottir H (2018) Hemispatial neglect following right hemisphere stroke: clinical course and sensitivity of diagnostic tasks. *Top Stroke Rehabil* 25: 120-30.
- Matsuoka T, Narumoto J, Okamura A, Taniguchi S, Kato Y, et al. (2013) Neural correlates of the components of the clock drawing test. *Int Psychogeriatrics* 25: 1317-23.
- Tranel D, Rudrauf D, Vianna EP, Damasio H (2008) Does the Clock Drawing Test have focal neuroanatomical correlates? *Neuropsychol* 22: 553-62.
- Lam LC, Chiu HF, Ng KO, Kei On Ng, Calais Chan, et al (1998) Clock-face drawing, reading and setting tests in the screening of dementia in Chinese elderly adults. *J Gerontol Ser B Psychol Sci* 53: P353-7.

18. Bryson GL, Wyand A, Wozny D, Rees L, Taljaard M, et al. (2011) The clock drawing test is a poor screening tool for postoperative delirium and cognitive dysfunction after aortic repair. *Can J Anaesth* 58: 267-74.
19. Adamis D, Morrison C, Treloar A, Macdonald AJ, Martin FC (2005) The performance of the Clock Drawing Test in elderly medical inpatients: does it have utility in the identification of delirium?. *J Geriatr Psychiatry Neurol* 18: 129-33.
20. Mendes-Santos LC, Mograbi D, Spenciere B, Charchat-Fichman H (2015) Specific algorithm method of scoring the Clock Drawing Test applied in cognitively normal elderly. *Dement Neuropsychol* 9: 128-35.
21. Seigerschmidt E, Mosch E, Siemen M, Forstl H, Bickel H (2002) The clock drawing test and questionable dementia: reliability and validity. *Int J Geriatr Psychiatry* 17: 1048-54.
22. Trenkle DL, Shankle WR, Azen SP (2007). Detecting cognitive impairment in primary care: performance assessment of three screening instruments. *J Alzheimers Dis* 11: 323-35.
23. Tene O, Sigler M, Shiloh R, Weizman A, Aizenberg D (2016) The clock-drawing test as a possible indicator of acute psychosis. *Int Clin Psychopharmacol* 31: 155-8.

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