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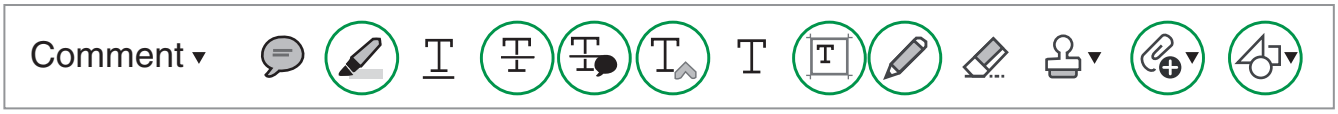

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Cognitive impairment in older patients undergoing colorectal surgery

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Abstract

Background: With increasing numbers of older people being referred for elective colorectal surgery, cognitive impairment is likely to be present and affect many aspects of the surgical pathway. This study is aimed to determine the prevalence of cognitive impairment and assess it against surgical outcomes.

Methods: The Montreal Cognitive Assessment (MoCA) was carried out in patients aged more than 65 years. We recorded demographic information. Data were collected on length of hospital stay, complications and 30-day mortality.

Results: There were 101 patients assessed, median age was 74 years (interquartile range = 68–80), 54 (53.5%) were women. In total, 58 people (57.4%) 'failed' the Montreal Cognitive Assessment test (score $\leq$ 25). There were two deaths (3.4%) within 30 days of surgery in the abnormal Montreal Cognitive Assessment group and none in the normal group. Twenty-nine (28.7%) people experienced a complication. The percentage of patients with complications was higher in the group with normal Montreal Cognitive Assessment (41.9%) than abnormal Montreal Cognitive Assessment (19.9%) ($p = 0.01$) and the severity of those complications were greater (chi-squared for trend $p = 0.01$). The length of stay was longer in people with an abnormal Montreal Cognitive Assessment (mean 8.1 days vs. 5.8 days, $p = 0.03$).

Conclusion: Cognitive impairment was common, which has implications for informed consent. Cognitive impairment was associated with less postoperative complications but a longer length of hospital stay.

Keywords

Older people, surgery, cognitive impairment, Montreal Cognitive Assessment

Introduction

In the developed world, the number of surgical procedures being performed on older patients is rising faster than the rate of population increase.[1] This is indicative of age no longer being a contraindication to surgical intervention. Older people are being referred to secondary care for elective colorectal surgery, including cancer surgery. This population includes those with cognitive impairment. The presence of cognitive impairment has several implications. Firstly, it has been shown that people with cognitive impairment have worse outcomes following surgery.[2,3] Secondly, informed consent may be influenced by the presence of cognitive impairment.[4] Finally, enhanced recovery programmes are now commonplace in elective colorectal surgery, with proven benefits in terms of length of hospital stay and reduced complication rates.[5] Whether these regimens are suitable and applicable to the older confused person is less clear.

In 2005, Nasreddine et al. characterised the Montreal Cognitive Assessment (MoCA) (www.mocatest.org), a tool that is particularly good at detecting mild cognitive impairment. It has subsequently become one of the commonest and most validated tools for assessing cognitive function.[6] Increasing use

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in the UK was, in part, driven by copyright restrictions regarding the use of the Mini Mental State Examination (MMSE),[7] previously the cognitive assessment tool of choice. In contrast to the MMSE, the MoCA is cost-free to use in clinical and educational based settings.

The MoCA has been assessed across a range of surgical settings[4,8,9] but never in elective colorectal surgery. The aim of this study was to assess the prevalence of cognitive impairment using the MoCA and assess any relationships between these results and a range of surgical outcomes; complications, death and length of hospital stay.

Methods

The MoCA is a 30-point questionnaire (see Figure 1, the MoCA assessment) (www.mocatest.com). Any score of 26 and above is considered normal. The MoCA has been used across a broad spectrum of clinical conditions and is well tested and validated against other cognitive assessment methods.[10,11] It is available in almost every major language.

We used the MoCA test in English (Original Version, 7.1). Staff gathering MoCA data underwent training in the implementation and use of the questionnaire, prior to commencing the study.

From June 2012 to June 2014, we prospectively assessed pre-operative cognition in all patients 65 years and older who were undergoing elective colorectal surgery for benign (predominantly diverticular disease) or malignant disease (colorectal cancer). Only patients unable to complete the test owing to inadequate visual perception were excluded from the study. During routine preoperative assessment, researchers based at North Bristol NHS Trust collected the MoCA data. Participant's age and sex were recorded. Patients were grouped by age (65–74, 75–84, and above 85 years). To characterise co-morbidity data were collected on the number of current medications[12] (grouped into $<$ or ≥ 5). Delirium was not assessed. Data were collected on length of hospital stay (rounded up as whole day integers), complications and 30-day mortality. Complications were characterised using the Clavien-Dindo scoring system.[13]

Data were collected from the hospital electronic patient records, clinical case notes and prescribing charts. All data were collated using a password-protected spreadsheet. Patients were anonymised, with identifiable data removed. Data were handled and stored according to local data management guidelines.

The study was registered according to local guidelines. As the study collated information collected as part of routine clinical care, mental state estimation being recommended as trust policy, the study was deemed a service evaluation project and as such did not require ethical approval.

Data analysis was carried out using STATA version 13. Continuous data are summarised as mean and median (interquartile range (IQR)) values and categorical data as frequencies with percentages. Comparisons were performed using Wilcoxon rank sum and chi-squared tests.

Results

There were 101 patients included in the study. Median age was 74 years (IQR = 68–80), two patients had missing data for age. Fifty patients were aged between 65 and 74 years, 37 between 75 and 84 years and 10 older than 85 years. There were 54 (53.5%) women. There were 58 people (57.4%) who failed the MoCA test (score ≤ 25). Overall, the mean score for the MoCA examination was 24.1 ('normal' ≥ 26, range = 8–30). Participants were taking an average number of 4.5 medications each (range = 0–11). There were 46 people (45.5%) taking five or more medications.

An abnormal MoCA was associated with increasing age group $p = 0.03$) (test for trend) or taking five or more medications ($p = 0.01$). There were two deaths (3.4%) within 30 days of surgery in the abnormal MoCA group, there were no deaths in the normal MoCA group. Twenty-nine (28.7%) patients experienced a complication (Clavien-Dindo Classification I–V). The percentage of patients with complications was higher in the group with normal MoCA (41.9%) than abnormal MoCA (19.9%) ($p = 0.01$) and the severity of those complications was greater (chi-squared for trend $p = 0.01$). People with an abnormal MoCA remained in hospital for longer (mean 8.1 days vs. 5.8 days, $p = 0.03$).These results are summarised in Table 1.

Procedures included right hemicolectomy, small bowl resection, reversal of Hartmans procedure, ileostomy, anterior resection and ventral mesh rectopexy. They were performed by both open and laparoscopic technique.

Discussion

This study has demonstrated that cognitive impairment, measured using the MoCA, is common in this elective older colorectal population, with 57.4% of patients having an abnormal score. Cognitive impairment was associated with a longer length of hospital stay. Despite this, people with cognitive impairment (MoCA score ≤ 25) experienced lower rates of complications. Furthermore, these complications were less severe.

This is the first study to document the prevalence of preoperative cognitive impairment in patients

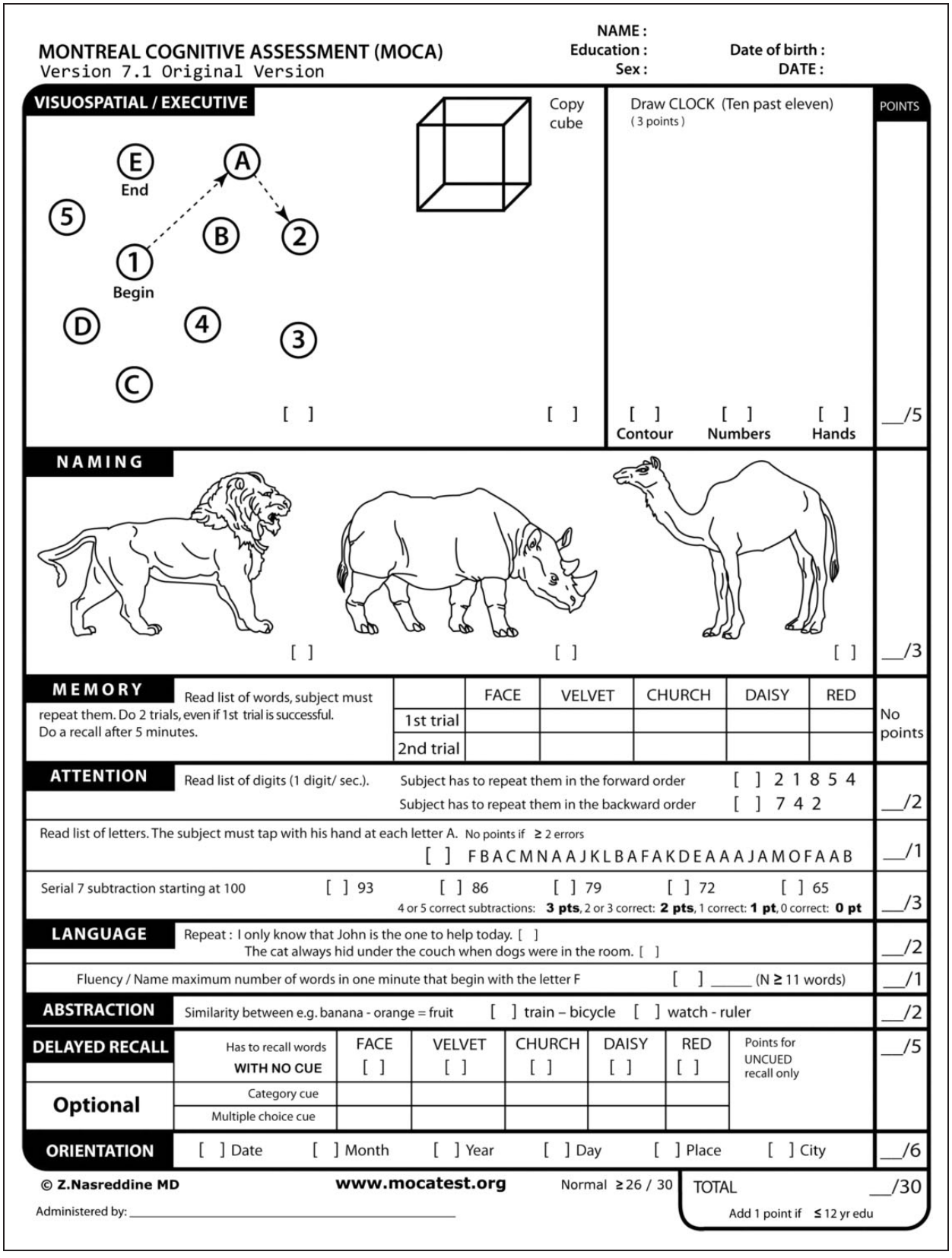

Figure 1. MoCA test.

Table 1. Complications and length of stay.

	Overall	Normal MoCA ($n=43$) (42.6%) ($\geq$26)	Abnormal MoCA ($n=58$) (57.4%) ($\leq$25)	*p* Value
Complications				
Yes	29	18 (41.9)	11 (19.0)	0.01[a]
No	72	25 (58.1)	47 (81.0)	
Clavien Dindo				
0	72	25 (58.1)	47 (81.0)	0.02[b]
Class				
I	8	4 (9.3)	4 (6.9)	
II	15	11 (25.6)	3 (5.2)	
III	0	0	1 (1.7)	
IV	4	3 (7.0)	1 (1.7)	
V	2	0	2 (3.5)	
Length of stay				
Median (IQR)	5 (3–8)	5 (3–6)	8 (4–9)	0.03[c]

Note: Clavien_Dindo classification – I: no need for treatment; II: pharmacological treatment; III: requiring surgical or endoscopic or radiological treatment (IIIa – not under GA, IIIb – under GA); IV: life threatening complication (IVa – single organ dysfunction, IVb – mutli organ dysfunction); V: death of a patient.

[a]Chi-square.

[b]Chi-square for trend.

[c]Wilcoxon Ranksum.

undergoing elective colorectal surgery. Therefore, direct comparisons with other studies are limited. One of the more comparable studies was conducted by our team in acute surgery. That paper assessed the prevalence of cognitive impairment in emergency general surgical patients in three UK centres. MoCA detected cognitive impairment in over 70% of the population,[4] higher than the present study. One possible explanation is delirium. Delirium is common in all acute hospital presentations of the older person,[14] estimated to be present in up to one-third of acute vascular[15] and a quarter of acute orthopaedic patients.[16] The MoCA score does not test for delirium, hence that study would not differentiate between the two. Thus, the difference between the two figures (57.4% vs. 70%) may be attributable to delirium. Delirium screening might be advocated for future research studies in this area.

There are clinical implications of managing the older elective surgical patient with cognitive impairment. People with cognitive impairment are more likely to develop incident delirium[3] and long-term cognitive dysfunction following surgery. For example, Monk et al. reported cognitive dysfunction following surgery in 41.4% of older patients discharged after major non-cardiac surgery.[17] Kline and colleagues also demonstrated that postoperative cognitive dysfunction is higher in people with pre-existing disease,[18] and a recent systematic review confirmed a higher rate of death in this patient group.[19]

Modification of anaesthetic techniques, have been shown to reduce the incidence of post-operative delirium.[20] Similarly, multi-task exercise programmes have shown improvements in function and cognition in elderly patients.[21] Ultimately, pre-operative identification and optimisation of those most at risk of delirium and post-operative cognitive dysfunction may lead to improvements in post-operative recovery, quality of life and mortality in older patients who are most at risk.

Perhaps the most striking finding of these results is the reduced rate of complications demonstrated in our population with an abnormal MoCA, both in the absolute number of complications and the severity of those recorded. This may be attributable to under-reporting by cognitively impaired patients leading to an underdiagnosis of complications by medical staff. For example, cognitively impaired people are less likely to report pain[22] and other physical symptoms. However, this might arguably result in increasing severity of complications when recognised. Prolonged length of stay in the abnormal MoCA group may be attributable to increase in required community care and social support on discharge. It may also reflect unrecognised (potentially minor) complications delaying the discharge from hospital in this group. Another potential complication may be that only physically fitter people, with cognitive impairment, were offered surgery, hence the lower rate of complications. However, we do not data to support that assumption.

The other major implication of these findings is whether the 57.4% of participants with abnormal MoCA scores are able to give informed consent for the operation they are about to undergo. The MoCA test is sensitive enough to detect mild cognitive impairment.[6,23] Therefore, some (perhaps a majority) of the abnormal results obtained represent people with substantial residual cognitive ability. While consent is decision-specific, it seems highly likely, based on these data that many of the individuals in this study may not have had sufficient capacity to complete fully informed consent. Whilst not addressed in this study, the study raises concerns that consent may not always be valid, an area for consenting surgeons to consider. Similarly, our other concern is whether cognitively impaired patients are fully able to comply with the enhanced recovery protocol, which involves early mobilisation, enhanced nutrition and the need to retain information and follow instructions. Perhaps there is a need to tailor a recovery pathway and indeed consenting process specifically for patients with cognitive impairment. Both these aspects of surgical care also highlight the

importance of comprehensive assessment of older surgical patients and particularly engaging patients, their relatives and their carers in managing expectations and clinical decision-making.

These data illustrate the high level of cognitive impairment in a population undergoing elective colorectal surgery. They also suggest a reduced rate of complications, and a greater length of hospital stay. Further larger scale studies may fully elucidate the impact of cognitive impairment on elective colorectal surgery and whether enhanced recovery programs are fully tailored to the cognitively impaired.

Declaration of Conflicting Interests

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