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Original Research

Cognitive decline after major oncological surgery in the elderly



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Abstract *Background:* Elderly patients undergoing oncological surgery experience postoperative cognitive decline. The aims of this study were to examine the incidence of cognitive decline 3 months after surgery and identify potential patient-, disease- and surgery-related risk factors for postoperative cognitive decline in onco-geriatric patients.

Methods: A consecutive series of elderly patients (≥ 65 years) undergoing surgery for the removal of a solid tumour were included ($n = 307$). Cognitive performance was assessed pre-operatively and 3 months postoperatively. Postoperative decline was defined as a decline in scores of cognitive tests of $\geq 25\%$ on ≥ 2 of 5 tests.

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Results: Of the patients who had completed the assessments, 117 (53%, 95% confidence interval [CI]: 47–60) had improved cognitive test scores, whereas 26 (12%, 95% CI: 7.6–16) showed cognitive decline at 3 months postoperatively. In patients aged >75 years, the incidence of overall cognitive decline 3 months postoperatively was 18% (95% CI: 9.3–27). In patients with lower pre-operative Mini-Mental State Examination (MMSE) score (≤ 26) the incidence was 37% (95% CI: 18–57), and in patients undergoing major surgery it was 18% (95% CI: 10.6–26). Of the cognitive domains, executive function was the most vulnerable to decline.

Conclusion: About half of the elderly patients show improvement in postoperative cognitive performance after oncological surgery, whereas 12% show cognitive decline. Advanced age, lower pre-operative MMSE score and major surgery are risk factors for cognitive decline at 3 months postoperatively and should be taken into account in the clinical decision-making progress. Research to develop interventions to preserve quality of life should focus on this high-risk subpopulation.

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1. Introduction

Approximately 3.45 million people in Europe were diagnosed with cancer in 2012, of which more than half in patients were aged ≥ 65 years [1,2]. As the population ages, and cancer is a disease of the elderly, the proportion of old and very old cancer patients increases [3]. As surgery is the principle treatment for most solid tumours, the number of elderly patients undergoing surgery is expected to increase rapidly in the upcoming decades. A substantial proportion of these elderly patients will experience cognitive decline, especially in memory and executive functioning when compared to pre-operative levels of cognition [4–6].

Cognitive decline can be observed in the first few days to weeks after surgery and persists for several months to years thereafter [7–9]. Postoperative cognitive decline has been associated with poor short- and long-term outcomes, including decreased quality of life, increased disability, increased mortality and greater utilisation of social and financial assistance [10,11]. Demographic factors as well as surgical characteristics might be associated with an increased risk of developing this complication [12–15]. Nevertheless, knowledge of the incidence and predictors of postoperative cognitive decline is inconclusive. This study is, as far as we know, the first to include a consecutive series of surgical oncological patients aged ≥ 65 years with pre- and postoperative tests.

The aims of this study were to examine the incidence of cognitive decline 3 months after surgery and identify potential patient-, disease- and surgery-related risk factors for postoperative cognitive decline in onco-geriatric patients. Insight into the incidence and risk factors for cognitive decline after surgery in this specific population may provide focus points for clinical decision-making and preventive interventions.

2. Methods

The ‘PICNIC’ (PostoperatIve Cognitive dysfunction In elderly Cancer patients) study was a prospective observational study conducted at the University Medical Center Groningen (UMCG, Groningen, the Netherlands). It was prospectively registered on the Dutch Clinical Trial Database (trial number NL31486.042.10), following approval by the Medical Ethical Committee of the UMCG. Data collection was conducted according to the Declaration of Helsinki.

A consecutive series of patients aged ≥ 65 years, admitted to the UMCG for the surgical excision of a solid tumour (see Table 1), were included. Patients were enrolled between July 2010 and April 2014. The following exclusion criteria were included: any physical condition potentially impeding compliance with the study, such as a severe visual or auditory impairment or a recent history of stroke or pre-operative cognitive deficits and insufficient understanding of the Dutch language. All surgical procedures were elective and performed in optimal conditions by an experienced surgical team, as the UMCG is a tertiary referral centre. Written informed consent was obtained from all participating patients, and patients’ identity was protected by coding data.

2.1. Cognitive domains

Neuropsychological tests to determine performance in three cognitive domains (memory, executive function and information processing speed) were conducted at baseline (approximately 2 weeks before surgery) and 3 months postoperatively.

2.1.1. Memory

Memory was assessed using the Dutch version of the Rey’s Auditory Verbal Learning Test (RAVLT) [16].

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