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Assessment of selected cognitive processes in elderly patients after urologic surgery

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ABSTRACT

Introduction: The issue of postoperative disorders of cognitive functions is a highly topical problem as more and more elderly people undergo medical treatments. Patients may lose the ability of assimilating information and their linguistic functions may deteriorate. Cognitive disorders may result in the temporary exclusion of the patient from social activity.
Aim: The purpose of the paper was to assess the incidence of certain cognitive disorders in the elderly after urological surgeries.
Material and methods: The study was conducted in a group of 218 patients aged over 65, male and female, after an urological surgery under different types of anesthesia. Standardized neuropsychological tests of cognitive functions were employed in the study.
Results: Analysis of the data showed that in the control group were obtained similar results in the study of the first and second. However, in the test group demonstrated a reduction cognitive function in all the tests in a second study.
Conclusions: The reduction of cognitive functions in the study group was observed in all the domains but it was the most marked in visual memory tests. Postoperative reduction of cognitive functions is correlated with the patient's age, education and mood. Postoperative reduction of cognitive functions is not correlated with the type of surgery, anesthesia and its duration.

1. Introduction

The elderly population is constantly increasing as a consequence of healthier lifestyle, advancements in medicine and demographic factors [1,2]. Together with the growing elderly population there are more and more health problems typical of the age group. Current studies show that the analyzed group is highly diversified. Not everyone ages in the same way. The assessment of the aging process of an elderly person should take into account, apart from calendar age which only slightly determines the person's mental and physical ability, their

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biological age, mental condition and social status, remembering however that these factors interact [3,4].

In elderly patients the impairment of the central nervous system depends on involutional changes and is significantly affected by insufficient blood flow to the brain. These changes lead to an impairment of memory and concentration. There are a large number of potentially reversible or transitory disorders of memory and other cognitive functions. Their causes are diverse and often complex, including renal insufficiency, diabetes, cerebral strokes, geriatric iatrogenic syndrome and hospitalizations [5,6].

Postoperative disorders of cognitive functions have been classified as a separate syndrome. Advancements in surgical and anesthesiological techniques have reduced the number of complications and mortality among patients undergoing surgical treatment. Nevertheless, postoperative disorders of cognitive functions remain a serious problem. Cognitive disorders lead to prolonged hospitalization, they generate higher costs and negatively affect the quality of life. Cognitive disorders can cause the patient's temporary exclusion from social activity, making him dependent on the help and care of others [3,5,6].

The purpose of the paper was to assess the incidence of certain early disorders of cognitive functions in the elderly undergoing urological surgeries.

An attempt has been made to answer the following questions:

1. What factors affected the reduction of cognitive functions in the study group?
2. What is the relationship between cognitive function disorders and the type of anesthesia, type of surgery, duration of anesthesia, age and education?

2. Material and methods

2.1. *Patient population*

The study was conducted upon approval of the study protocol by the Independent Ethics Committee for Scientific Research. The studies lasted three years. 244 subjects were invited to the study and 188 completed it. All the subjects were patients of the Urology Clinic.

The inclusion criteria were: patients aged 65 and over, male or female, qualified for urological surgeries and who gave their consent for the assessment, without dementia in screening tests of cognitive function, with no evidence of depression in screening tests, with no drug and alcohol addiction; assessed according to the scale of anesthesia-related risk of the American Society of Anesthesiologists as ASA I, II, III, anesthetized without limitations as to the method applied.

The exclusion criteria were: patients who scored 23 or less in the MMSE, on anti-depressing and sedative medications, patients who underwent neuropsychological tests 1–2 years ago, those who did not give their consent, who do not understand the language spoken, suffering from serious hearing or sight impairment, illiterate patients, patients with Parkinson's disease, abusing alcohol or addicted to drugs.

2.2. *Neuropsychological tests*

The following standardized neuropsychological tests of cognitive functions were used to assess the patients.

For the global assessment of cognitive functions:

Mini-Mental State Examination (MMSE) – a global assessment of cognitive functions. MMSE is a simple tool used to assess the basic dimensions of cognitive activity. During the examination the patient is asked a number of questions concerning the sense of space and time. Further tasks are related to: memorizing, attention, calculating, recalling, concentration, reproduction of previously memorized information, naming, reading, writing and carrying out complex orders. Points are awarded for each correct answer: 30–28 points for the norm, 27–24 points for minor cognitive disorders, according to the diagnostic criteria, a score below 24 points on the MMSE scale suggests the dementia syndrome [7–9].

For the assessment of short-term memory:

Auditory Verbal Learning Test – AVLT – measures the upper limit of immediate memory, reveals the learning curve or its lack, showing tendencies to retro- and proactive interference and a tendency to confusion and confabulation in memory tasks. It also measures the preservation of memorized information after another overlapping activity. It is a verbal learning test used to assess short-term memory and verbal learning ability. A list of fifteen semantically unrelated words was read five times in succession. The patient repeated the words heard five times in succession. The number of words repeated for the first time was an indicator of learning ability. The total number of words repeated in the subsequent turns was considered a gauge of learning ability. Subsequently, a short story was read to the patient who was asked to recognize the words from the previously read list of fifteen words in it [10,11].

Wechsler's Memory Span (WAIS) – a subtest of ''digit repetition'' is used to assess short-term auditory memory. The investigator reads out increasing digit sequences starting from a single digit and the subject repeats them immediately afterwards, forwards and backwards. The test was interrupted after two false repetitions of a sequence of the same number of digits [10].

Visual Memory Test (the so-called Brain Damage Diagnosing Test, BDD) – the test evaluates spatial learning and memory on figural material. According to the test's accuracy studies, the BDD test can be assumed to comprise the following functions:

- concentration,
- perception of figures,
- immediate memory of figures,
- ability to recall figures and transfer this ability onto the motor plane.

The test material consisted of 9 white cards. A figure of 5 black lines was drawn on each card. The subject's task was to remember a series of figures and recall them from memory using sticks. No time limit was applied. If the subject correctly completed all the 9 figures during the recall test, the test could be finished [12].

Geometric Pattern Memory Test (Benton) – measures immediate visual memory; a variant of the visual memory test. The