

## SUMMARY

**Title:** Monitoring of selected cognitive disorders in patients after thoracic surgery under general anaesthesia.

**Introduction:** Post-Operative Cognitive Dysfunction (POCD) occurring after surgeries is a common and clinically significant complication. These disorders affect mainly memory and executive functions. Although they have been accompanying patients for a very long time, they are still an issue, not fully understood, which requires a deeper analysis.

**Aim of the work:** To analyse selected cognitive disorders and determine factors influencing cognitive function disorders of patients undergoing thoracic surgery under general anaesthesia.

**Materials and methods:** The group of subjects were patients undergoing thoracic surgery, consisting of lung resection under general anaesthesia, divided into three groups depending on the extent of resection: pneumonectomy, lobectomy, segmentectomy and marginal and wedge resections. The tests were carried out in three stages (test I - on the day preceding the surgery, test II - not earlier than on the 7th day after surgery, test III - 3 months after the procedure), in the period from February 19, 2019 to April 27, 2020. 141 patients who gave informed consent were enrolled in the study. Three patients participated only in the first stage of the study (two of them died as a result of postoperative complications, one person after surgery was transported to the ICU). 138 patients finally participated in all three phases of the study. The study was conducted among patients of the Holy Family Specialist Hospital in Rudna Mała near Rzeszów - Department of Thoracic Surgery. The research method was a diagnostic survey. The research tools used in the study included: Shortened Hodgkinson Mental Test (AMTS Abbreviated Mental Test Score), Author's questionnaire, Interview Questionnaire (subjective survey), Beck Depression Scale, David Goldberg's General Health Questionnaire - GHQ -28, Short Mental State Assessment Scale (MMSE) - M. F. Folstein, S.E. Folstein, P.R. McHugh, G. Fanjiang, Perceived Stress Scale - PSS-10, Montreal MoCA Cognitive Assessment Scale, AMTS Abbreviated Mental Test Score and spirometer. Elements of descriptive statistics and a measure of differentiation were used to develop the data. In order to compare the compatibility of diagnoses using all scales and measurements, statistical analysis was carried out using: Chi square, Mann-Whitney test), Kruskal-Wallis test and Ch. Spearman rank correlation. The calculations were made using Microsoft Excel functions and Statistica 11 PL from StatSoft Polska.

**Results:** The analysis of the severity of depression in patients after thoracic surgery under general anaesthesia in the present study showed that immediately after the procedure the severity of depression increased significantly, and after 3 months after the procedure it systematically decreased ( $p < 0.05$ ). The results showed that gender, age and education differentiated the severity of depression. Women had a higher level of depression than men both before and 7 days after surgery, as well as 3 months ( $p < 0.05$ ). As the age increased, the severity of depression also increased in the examined patients on the day of discharge from the hospital and 3 months after surgery (see  $< 0.05$ ). The cognitive functioning of patients after thoracic surgery under general anaesthesia was impaired in the early postoperative period, and 3 months after the procedure there was a clear improvement in this area, as indicated by the occurrence of a high level of cognitive functioning ( $p < 0.05$ ). Those who did not have surgery to remove the tumour had higher levels of cognitive functioning both before and after surgery than those who underwent surgery to remove the tumour (see  $< 0.05$ ). Gender, age and education significantly differentiated the level of cognitive impairment in patients. Women had significantly higher cognitive impairments after thoracic surgery ( $p < 0.05$ ). In addition, as age increased, cognitive impairment increased ( $p < 0.05$ ), and the level of the education, the better cognitive functioning ( $p < 0.05$ ). With the increase in the length of hospitalization, the level of cognitive functioning decreased, also people who had normal spirometry had a higher level of cognitive functioning (the worse the spirometry results, the greater cognitive disorders) ( $p < 0.05$ ). The difference in stress severity in patients before and after thoracic surgery was not statistically significant ( $p > 0.05$ ). There were small changes in the severity of stress in stage II, a slight increase in the average and high level of stress, and after 3 months after the procedure, 44.9% of the respondents demonstrated a high severity of stress, however, these differences were not statistically significant. It was also shown that gender differentiated the severity of stress in patients before and after thoracic surgery - women in all stages of the study had a higher level of stress severity compared to men ( $p < 0.05$ ). Analysis of mental health disorders in patients before and after thoracic surgery under general anaesthesia showed that in the second stage of the study the mental health condition deteriorated, and after 3 months after the procedure, a clear improvement in health was visible ( $p < 0.05$ ). Analyzing the state of mental health, it was noted that in the second stage somatic symptoms and functional disorders aggravated, anxiety and insomnia increased, and after 3 months after the procedure, a significant improvement in health was observed in this respect ( $p < 0.05$ ). Thoracic surgery for cancer caused significant differences in mental health. People who underwent surgery to remove the cancer demonstrated

poorer mental health (overall score), as well as higher somatic disorders, functional disorders and symptoms of depression ( $p < 0.05$ ). Gender, age, and education differentiated some aspects of mental health. As a part of their overall health, women showed worse mental state compared to men in all stages of the study. Women had higher levels of somatic disorders in stage II and III, experienced higher levels of anxiety and insomnia, higher levels of functional disorders and symptoms of depression 3 months after surgery (see  $< 0.05$ ). As the age increased, functional disorders increased. In addition, patients immediately after surgery revealed that the higher the education, the higher the somatic disorders ( $p < 0.05$ ). As the severity of depression increased, cognitive impairment increased immediately after surgery and the 3 months after surgery (see  $< 0.05$ ). Our study also showed that as depression and stress increased, mental health deteriorated, including an increase in the level of somatic disorders, anxiety and insomnia, and functional disorders ( $p < 0.05$ ). Deterioration of overall mental health also increased cognitive impairment 3 months after surgery (see  $< 0.05$ ). Increased depression resulted in an increase in cognitive impairment 3 months after surgery, and also worsened general mental health, somatic disorders, increased anxiety, insomnia and functional disorders ( $p < 0.05$ ). Our study has also demonstrated a relationship between the state of health in patients before surgery and cognitive disorders after thoracic surgery. The increase in functional disorders before surgery worsened the cognitive functioning of patients in the early postoperative period. Deterioration of general mental health, increased anxiety, insomnia and functional impairment before surgery worsened the cognitive functioning of patients 3 months after surgery ( $p < 0.05$ ). Depending on the type of surgery performed, differences were found in the level of depression, cognitive impairment, severity of stress and mental health status of patients before and after thoracic surgery. This was especially true for lobectomy and pneumonectomy ( $p < 0.05$ ). Own research has shown that in the case of lobectomy immediately after the procedure, compared to the period before the procedure, there was a sharp increase in the severity of depression (by 47.5%), cognitive functioning (by 8.86%) and mental health (by 11.33%) deteriorated. In the period from discharge from hospital to 3 months, the severity of depression decreased significantly (by 10.21%), cognitive functioning improved by as much as 30.56% and overall mental health improved by 33.2%. In addition, performing lobectomy improved cognitive functioning (by 11.67%) at 3 months after surgery and mental health (by 12.1%) compared to the period before surgery. The level of depression during this period increased slightly - by 8.84%.

**Conclusions:** Older age, female gender, lower education, prolonged hospital stay determine the occurrence of depression in patients in the pre- and postoperative period.

Age, sex, education, length of hospital stay, respiratory capacity, differentiated cognitive impairment in the pre- and postoperative period. Functional disorders before surgery affected the worse cognitive functioning of patients immediately after surgery. The occurrence of stress and depression before the procedure exacerbated the level of cognitive impairment after the surgical procedure, as well as the deterioration of mental health (including increased somatic disorders, anxiety and insomnia, and functional disorders).

**Keywords:** patient, postoperative cognitive disorders, thoracic surgery, perioperative care.