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Evaluation of Everyday Activities in Patients after Brain Tumor Surgery

Ocena czynności życia codziennego u pacjentów po operacji guza mózgu

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Abstract

Introduction. Functional fitness enables satisfying and performing basic everyday needs in a safe and independent way. Its assessment is currently the basic component of the overall assessment of the patient.

Aim. The aim of the study was to evaluate the functional capacity of patients after brain tumor surgery. The analysis included selected factors that may affect patient's performance after the surgery.

Material and Methods. The study included 165 patients of neurosurgical wards hospitalized for a brain tumor. Surgeries were performed in all of them — and consisted in partial or complete removal of the pathological mass by craniotomy. Patient's functional assessment on the day of admission and on the discharge day was analyzed with the use of FCS, KPS, BI, FIR, GOS scales.

Results. The largest number of respondents on the day of admission were patients in the first group according to FCS scale — independent — 138 respondents (83.6%). None of the patients qualified for group IV with total dependence. In turn, on the day of discharge, the percentage of respondents qualified to group I was 127 people (77.0%), whereas 1 person became completely dependent. Similar results were obtained in other measuring tools. The observed differences in each of the tests carried out did not turn out to be statistically significant. On KPS, BI and GOS scales, the age turned out to be statistically significant at $p=0.000$. On the other hand, on FCS, KPS and GOS scales, the state of consciousness was also statistically significant at $p=0.000$.

Conclusions. Most of the respondents show very good functional capacity both on the day of admission and on the day of discharge. However, patients scored slightly better on the day of admission to the ward. Such factors as age and consciousness before surgery significantly affect patient's functional capacity on the day of discharge. (JNPN 2018;7(3):111–117)

Key Words: brain tumor, outcomes, functional assessment

Streszczenie

Wstęp. Sprawność czynnościowa (funkcjonalna) umożliwia zaspokajanie i wykonywanie podstawowych potrzeb dnia codziennego w sposób bezpieczny, samodzielny. Jej ocena stanowi w chwili obecnej podstawowy komponent całościowej oceny pacjenta.

Cel. Celem pracy była ocena wydolności czynnościowej pacjentów po operacji guza mózgu. Analizie poddano wybrane czynniki mogące mieć wpływ na wydolność czynnościową pacjenta po zabiegu operacyjnym.

Materiał i metody. W badaniu uczestniczyło 165 pacjentów oddziałów neurochirurgii hospitalizowanych z powodu guza mózgu. U wszystkich został wykonany zabieg operacyjny — polegający na częściowym lub doszczętnym usunięciu masy patologicznej drogą kraniotomii. Analizie poddano ocenę czynnościową pacjenta w dniu przyjęcia oraz w dniu wypisu za pomocą skali FCS, KPS, BI, FIR, GOS.

Wyniki. Najwięcej badanych w dniu przyjęcia, to pacjenci będący w I grupie według skali FCS — niezależni — 138 osób (83,6%). Żaden pacjent nie został zakwalifikowany do grupy IV o całkowitej zależności. Z kolei w dniu wypisu odsetek respondentów zakwalifikowanych do grupy I wyniósł 127 osób (77,0%), natomiast jedna osoba stała się całkowicie zależna. Podobne wyniki zostały uzyskane w pozostałych narzędziach pomiarowych. Zaobserwowane różnice w każdym z przeprowadzonych testów nie okazały się istotne statystycznie. W skali KPS, BI oraz GOS wiek okazał się istotny statystycznie na poziomie $p=0,000$. Z kolei w skali FCS, KPS oraz GOS stan przytomności także okazał się istotny statystycznie na poziomie $p=0,000$.

Wnioski. Większość badanych zarówno w dniu przyjęcia, jak i w dniu wypisu wykazuje bardzo dobrą wydolność funkcjonalną. Jednak nieznacznie lepszą ocenę czynnościową uzyskali pacjenci w dniu przyjęcia na oddział. Czynniki takie jak wiek oraz przytomność przed zabiegiem operacyjnym istotnie wpływają na wydolność funkcjonalną chorego w dniu wypisu. (PNN 2018;7(3):111–117)

Słowa kluczowe: guz mózgu, wyniki, ocean funkcjonalna

Introduction

Functional fitness enables satisfying and performing basic everyday needs in a safe, independent way and without excessive effort. In the medical nomenclature it is also referred to as functional capacity or functional activity [1,2]. Its assessment is currently the basic component of the overall assessment of the patient [3]. It is necessary for the proper selection of diagnostic, prophylactic, therapeutic, rehabilitation, nursing, social and psychological activities [4].

Neurological diseases significantly interfere with the proper daily functioning of patients. Brain tumors can also be regarded as diseases which reduce functional efficiency. They constitute a considerable therapeutic problem, as they lead to the disruption of basic vital functions and are the cause of disability among patients [5]. The natural development and growth of the brain tumor causes damage to individual centers or nerve pathways. The applied treatment and the progressive proliferation process play an important role in the functional activity of patients. The use of clinimetry in nursing practice allows us to assess the functional and clinical status of the patient at every stage [6–8].

The aim of the study was to assess the functional capacity of patients after brain tumor surgery. The analysis involved selected factors that may affect patient's performance after the surgery.

Material and Methods

Subjects

The study included 165 patients of neurosurgical wards, hospitalized for a brain tumor. Surgeries were performed in all of them — consisting in partial or complete removal of the pathological mass by craniotomy. A detailed characteristics of the population studied are shown in Table 1.

Table 1. Characteristics of the study group

| Variable | N | % |
|--|-----|------|
| Gender | | |
| Woman | 79 | 47.9 |
| Man | 86 | 52.1 |
| Age | | |
| to 30 years | 18 | 10.9 |
| 31–40 years | 21 | 12.7 |
| 41–50 years | 27 | 16.5 |
| 51–60 years | 39 | 23.6 |
| 61–70 years | 39 | 23.6 |
| 71–80 years | 21 | 12.7 |
| Place of residence | | |
| Countryside | 56 | 33.9 |
| City | 109 | 66.1 |
| GCS | | |
| I (15–13 points) — mild impairment | 159 | 96.4 |
| II (12–9 points) — moderate impairment | 6 | 3.6 |
| III (8–3 points) — loss of consciousness | 0 | 0.0 |
| The length of hospitalization after surgical treatment | | |
| 1–3 days | 10 | 6.1 |
| 4–6 days | 30 | 18.2 |
| 7–10 days | 64 | 38.8 |
| Over 10 days | 61 | 36.9 |

Procedure

The patients were examined twice, i.e., on the day of admission (assessment 1) and on the day of discharge (assessment 2). The assessment was performed by a trained team of neurosurgical nurses with the use of standardized measuring tools.

Instruments

The functional capacity was measured with Functional Capacity Scale (FCS) [9,10] a tool used for the assessment of patients after neurosurgical treatment. This scale categorizes the patient’s independence and need for assistance into four groups and at the same time it assesses patient’s functional capacity. For comparison patients were also assessed using the Karnofsky Performance Scale (KPS) [11,12], Glasgow Outcome Scale (GOS) [13], Barthel Index (BI) [14,15], Functional Index “Repty” (FIR) [16] and the GCS [17].

Statistical Analysis

A descriptive analysis was performed using Means and Standard Deviations. Correlations between variables were studied using Spearman’s rank correlation coefficient

(r_s) or Mann–Whitney U-test (Z). The statistical significance level was set at $p \leq 0.05$. Data were analyzed using Microsoft Excel and Statistica version 10.0.

Ethical Approval

The study was approved by the Bioethics Commission at Collegium Medicum, Nicolaus Copernicus University, Toruń, Poland (291/2013 and 564/2014).

Results

Functional Assessment Before and After the Surgery

Patient’s functional assessment was analyzed on the day of admission and on discharge day using the FCS, KPS, BI, FIR, GOS scales (Table 2 and Figures 1–4).

Table 2. The functional capacity of patients assessed with FCS, KPS, BI, FIR, GOS

| | Assessment 1 | | Assessment 2 | |
|--|---------------------|------|--------------|------|
| | N | % | N | % |
| 1 | 2 | 3 | 4 | 5 |
| FCS | | | | |
| I group; patient does not need assistance/independence | 138 | 83.6 | 127 | 77.0 |
| II group; patient needs assistance/mild dependence | 20 | 12.1 | 32 | 19.4 |
| III group; patient needs significant help/moderate dependence | 7 | 4.2 | 5 | 3.0 |
| IV group; patient needs intensive care/dependence | 0 | 0.0 | 1 | 0.6 |
| $\bar{x} \pm SD$ | 43.72±5.24 | | 43.07±6.07 | |
| Min_Max | 24_48 | | 12_48 | |
| Med | 46.0 | | 46.0 | |
| Mann–Whitney U test Z (N=165) | 0.25; p= 0.617 n.s. | | | |
| KPS | | | | |
| I group — correct condition | 113 | 68.5 | 109 | 66.1 |
| II group — the state of inability to perform work or proper activity | 43 | 26.1 | 49 | 29.7 |
| III group — state of inefficiency and necessity of special care | 9 | 5.4 | 7 | 4.2 |
| IV group — death | 0 | 0.0 | 0 | 0.0 |
| $\bar{x} \pm SD$ | 86.52±19.10 | | 81.04±20.80 | |
| Min_Max | 20_100 | | 30_100 | |
| Med | 90.0 | | 90.0 | |
| Mann–Whitney U test Z (N=165) | 0.73; p= 0.613 n.s. | | | |
| BI | | | | |
| I group (100–86 points) — slight efficiency limitation | 128 | 77.6 | 112 | 67.9 |
| II group (85–21 points) — moderate efficiency limitation | 32 | 19.4 | 45 | 27.3 |
| III group (20–0 pkt) — very serious limitation of efficiency | 5 | 3.0 | 8 | 4.8 |
| $\bar{x} \pm SD$ | 87.72±24.89 | | 82.34±27.86 | |
| Min_Max | 5_100 | | 0_100 | |
| Med | 100.0 | | 100.0 | |
| Mann–Whitney U test Z (N=165) | 0.48; p= 0.712 n.s. | | | |

Table 2. Continued

| | 1 | 2 | 3 | 4 | 5 |
|--|-------------------------------|--------------------|------|-------------|------|
| FIR | | | | | |
| I group — total dependence (15–40 points) | | 1 | 0.5 | 2 | 1.1 |
| II group — considerable dependence (41–64 points) | | 3 | 1.9 | 8 | 4.9 |
| III group — partial dependence (65–84 points) | | 30 | 18.2 | 29 | 17.6 |
| IV group — independence (85–105 points) | | 131 | 79.4 | 126 | 76.4 |
| | $\bar{x}\pm SD$ | 95.49±19.80 | | 92.41±23.24 | |
| | Min_Max | 19_105 | | 15_105 | |
| | Med | 105.0 | | 105.0 | |
| | Mann–Whitney U test Z (N=165) | 0.43; p=0.674 n.s. | | | |
| GOS | | | | | |
| 5 — the patient can lead a normal life — recovery | | – | | 94 | 57.0 |
| 4 — slight disability, the patient is independent | | – | | 38 | 23.0 |
| 3 — severe disability, the patient needs help in everyday activities | | – | | 32 | 19.4 |
| 2 — fixed vegetative state | | – | | 1 | 0.6 |
| | $\bar{x}\pm SD$ | – | | 4.36±0.81 | |
| | Min_Max | – | | 2_5 | |
| | Med | – | | 5.0 | |

$\bar{x}\pm SD$ — mean value and standard deviation; Min_Max — minimum and maximum; Med — median

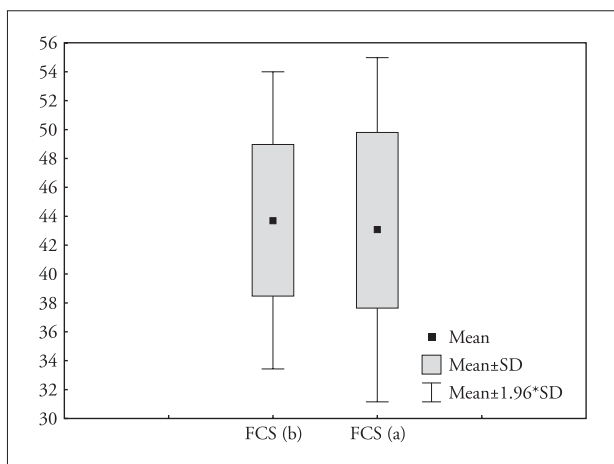


Figure 1. FCS before (b) and after (a) the surgery

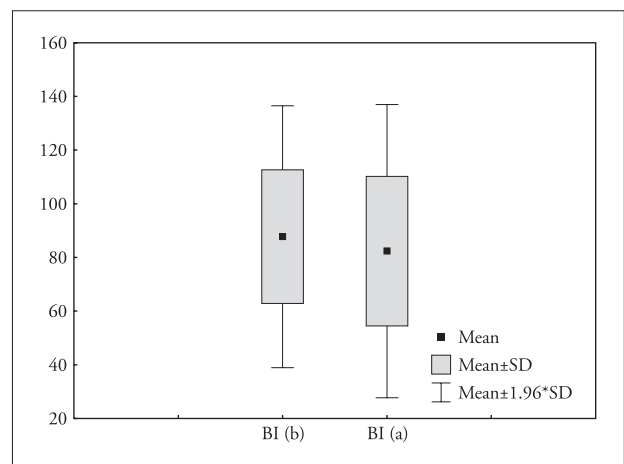


Figure 3. BI before (b) and after (a) the surgery

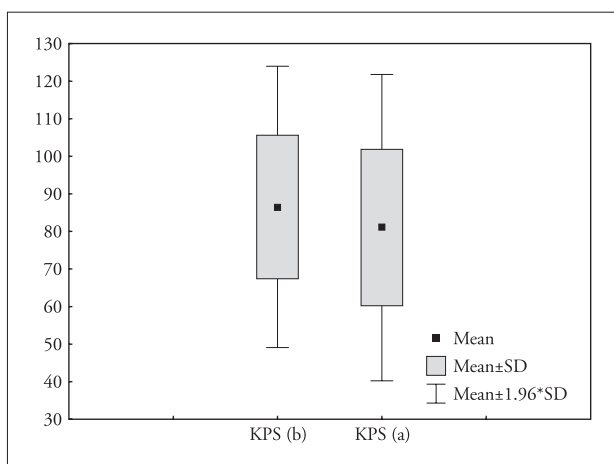


Figure 2. KPS before (b) and after (a) the surgery

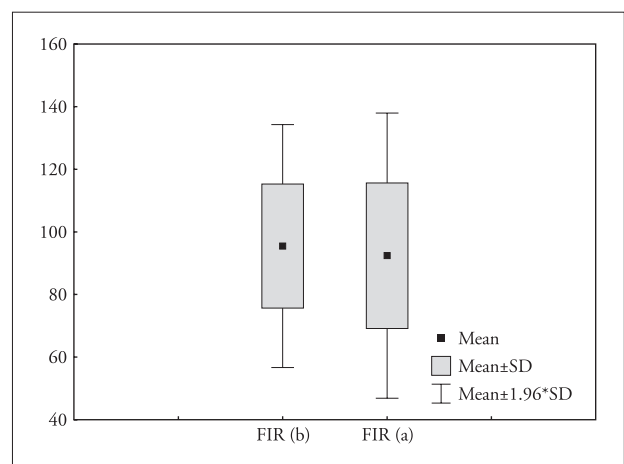


Figure 4. FIR before (b) and after (a) the surgery

The largest number of respondents on the day of admission were patients in the first group — independent — 138 people (83.6%). None of the patients qualified for group IV of total dependence. In turn, on the day of discharge, the percentage of respondents qualified to group I was 127 people (77.0%), whereas 1 person became completely dependent. The differences observed were not statistically significant ($p=0.617$). On the other hand, when assessing patients using the KPS tool, the highest percentage on the day of admission includes the patients who are also in the group 1 — in the normal condition — 113 respondents (68.5%). Nearly 26% of respondents were qualified to group 2, where patients have difficulties with performing work or proper activity. However, after the surgery 109 people (66.1%) were qualified to group I and 49 (29.7%) to group II. The differences obtained did not turn out to be statistically significant ($p=0.613$). In turn, according to the Barthel Index, the highest percentage of patients on the day of admission and on the day of discharge was qualified to group I with a slight limitation of disability. The smallest percentage of respondents, i.e. 5 people on the day of admission and 8 people on the day of discharge, are patients in group III with very severely limited efficiency. The differences observed were not statistically significant ($p=0.712$). Similar results were also obtained using the

FIR scale. The highest percentage of those surveyed, both on the day of admission and their discharge, are patients in group IV, i.e. independent. Patients partially dependent (group III) on the day of admission included 30 respondents (18.2%) and 29 respondents (17.6%) on the day of discharge. The differences obtained were also not statistically significant ($p=0.674$). After the surgery, nearly 94 people (57.0%) are patients who can lead a normal lifestyle, recovering. In turn, 23.0% are patients with minor disability, but still independent. 32 people were severely disabled (19.4%), whereas the vegetative state was recorded in the case of 1 person (0.6%).

Selected Factors and Functional Capacity

An analysis of the influence of selected factors on functional capacity among patients was also carried out (Table 3). Both gender and place of residence did not have statistically significant influence on functional capacity. Age and state of consciousness turned out to be statistically significant in each of the tools applied. In contrast, the time of hospitalization correlates with patient’s functional efficiency in the Barthel Index rating ($p=0.014$).

Table 3. Variables and functional capacity

| | Gender | | Age | | Place of residence | | State of consciousness | | The number of hospitalization days | |
|-----|--------|-------|----------------|-------|--------------------|-------|------------------------|-------|------------------------------------|-------|
| | Z | p | r _s | p | Z | p | r _s | p | r _s | p |
| FCS | -0.559 | 0.576 | 0.262 | 0.001 | 1.174 | 0.240 | -0.418 | 0.000 | 0.086 | 0.273 |
| KPS | 0.836 | 0.403 | -0.391 | 0.000 | 0.364 | 0.716 | 0.294 | 0.000 | -0.042 | 0.589 |
| BI | -1.777 | 0.076 | 0.438 | 0.000 | 1.578 | 0.115 | -0.312 | 0.003 | 0.234 | 0.014 |
| FIR | 0.993 | 0.321 | -0.360 | 0.001 | -0.277 | 0.782 | 0.245 | 0.027 | -0.159 | 0.154 |
| GOS | 0.479 | 0.632 | -0.426 | 0.000 | -0.071 | 0.943 | 0.309 | 0.000 | -0.080 | 0.304 |

Discussion

The study includes a functional assessment of patients during the period of neurosurgical treatment. The functional capacity of patients on the day of admission and on the day of discharge was analyzed. The rating indicator included such criteria as, for example, mobility, nutrition, hygiene activities, physiological needs. Making a reliable and systematic functional assessment will allow to prepare intervention, treatment, care and rehabilitation programs. It also enables observation of the individual pace of changes in particular deficits, including neurological ones [18].

In the obtained results, the functional assessment of the patient with brain tumor on the day of admission

and on discharge day was analyzed using the FCS, KPS, BI, FIR, GOS scales. The highest percentage of respondents, in each of the applied tools, are patients who are independent and deficit-free in self-care and self-service. The results obtained on the day of admission and on the day of discharge did not turn out to be statistically significant in any of the scales applied. On the other hand, the influence of age and state of consciousness turned out to be significant. A study carried out by Ferroli et al. [19] among 746 patients (53.2% women, mean age 51.3±17.1) with central nervous system (CNS) hyperplasia showed that in 523 (70.1%) of the respondents after the surgical procedure their functional capacity improved or remained unchanged whereas in 223 respondents (29.9%), the functional status deteriorated. In a study conducted by

Lorencowicz et al. [20], nearly 48.15% of respondents after the performed neurosurgery assessed their health condition as very good or good. Over two thirds of respondents declared full functional capacity. In a study conducted by Gosal et al. [21], among 33 patients diagnosed with meningioma, it was shown that in nearly 60.6% of them their functional capacity after the applied neurosurgical procedure had been assessed as very good. However, in the study carried out by Skeie et al. [22], a significant improvement of functioning and of the quality of life assessed after the performed Gamma Knife radiosurgery was observed. In the research carried out by Mwita et al. [23], patients with brain tumors were also assessed for functional performance before and after the surgery. The median of functional capacity prior to the procedure according to KPS was 50. On the day of discharge, the median of the functional assessment was also 50, however it improved to 60 in the 12th week following the surgery. On the other hand, in studies carried out by Stienen et al. [24], it was shown that after the applied neurosurgical procedure, nearly 40.8% of the respondents regained their functional independence. After 3 months, the percentage of independent patients increased to 52.4%. Kos et al. [25] in their work emphasize that in patients with a central nervous system hyperplasia, a more accurate assessment of the functional condition should be made both before as well as after the surgery. It is the functional activity recognized which future comprehensive treatment of the patient depends on.

Conclusions

1. The functional capacity of patients on the day of admission and on the day of discharge is recorded at a similar level and mainly concerns patients who are self-sufficient and free of self-service deficits.
2. The age and consciousness of the patient before the surgery significantly affect their functional capacity on the day of discharge.

Implications for Nursing Practice

This work presents functional assessment of patients after brain tumor surgery. Functional fitness is one of the main determinants of the quality of life. Such an assessment is a process necessary to identify areas of individual deficits. It may allow the preparation of intervention, treatment, care and rehabilitation programs, as well as the assessment of an individual pace of changes in each self-service and self-care deficit. Knowledge of these issues will enable nurses caring for such patients

to properly prioritize their patients' needs. Functional capacity should be an inseparable element of diagnosis and nursing care.

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(A — Concept and design of research, B — Collection and/or compilation of data, C — Analysis and interpretation of data, D — Statistical analysis, E — Writing an article, F — Search of the literature, G — Critical article analysis, H — Approval of the final version of the article, I — Acquisition of assets [eg financial])

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