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The Functional Assessment of Patients in the Period of Neurosurgical Treatment

Ocena czynnościowa pacjentów w okresie leczenia neurochirurgicznego

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Abstract

Introduction. The interests of scientists, especially in the field of medicine and health science, contemplate the functional condition of patient in recent years. Proper functional capacity with good state of being and psychological attitude are the most important health indicators. Proper functional capacity is defined as the ability for independent performance and covering of basic vital needs, e.g. the control of the sphincter, nutrition, mobility and maintaining proper hygiene. The proper functional capacity of the whole system of vital activities means independence.

Aim. The main aim of this study was the functional assessment of patients in the period of neurosurgical treatment.

Material and Methods. The study included 415 patients hospitalized on neurosurgical wards. The functional capacity of patients was assessed twice (on the day of admission — Assessment 1 and on the day of discharge — Assessment 2). Functional capacity was analyzed using Functional Capacity Scale (FCS). The direct observation with measurement technique was used. The research proposal was approved by the bioethics committee.

Results. On the day of admission, most of the patients (n=249; 60%), showed independence. Most of the independent patients were in the group of patients with tumors — 138 (83.6%), the second group were patients with brain aneurysm — 63 (63.0%) and the third group were patients with trauma — 48 (32.0%) (p<0.05). Most of the patients (n=314; 76%) were independent on the day of discharge. Among them, there were patients with brain tumor — 127 (77.0%), trauma — 112 (74.7%) and aneurysm — 75 (75.0%) (p>0.05).

Conclusions. Most of the patients after neurosurgical treatment showed better functional capacity when compared with the period before it. Patients with brain tumors showed considerably better functional capacity on the day of admission when compared with patients with trauma or aneurysm. (JNPN 2016;5(2):46–52)

Key Words: functional capacity, FCS, neurosurgery

Streszczenie

Wstęp. Na przestrzeni ostatnich lat zainteresowania naukowców głównie z obszarów medycyny i nauk o zdrowiu, kontemplują się wokół oceny stanu funkcjonalnego pacjenta. Zadowolająca wydolność funkcjonalna wraz z dobrym samopoczuciem i psychologicznym nastawieniem stanowi najważniejszy wskaźnik zdrowia. Definiuje się ją jako zdolność do samodzielnego realizowania i zaspokajania podstawowych potrzeb życiowych tj. kontroli czynności zwieraczy, odżywiania, poruszania, czy utrzymywania higieny osobistej. Prawidłowa wydolność funkcjonalna całego ustroju do pełnienia czynności życiowych oznacza niezależność.

Cel. Głównym celem pracy była ocena czynnościowa pacjentów w okresie leczenia neurochirurgicznego.

Materiał i metody. Badania przeprowadzono na grupie 415 pacjentów hospitalizowanych na oddziale neurochirurgii. Badanie polegało na dwukrotnej ocenie stanu czynnościowego pacjenta (w dniu przyjęcia — ocena 1 i w dniu wypisu — ocena 2) za pomocą Functional Capacity Scale (FCS). W tym celu zastosowano obserwację bezpośrednią z wykorzystaniem pomiaru. Na przeprowadzenie badań uzyskano zgodę Komisji Bioetycznej.

Wyniki. W dniu przyjęcia na oddział większość pacjentów ($n=249$; 60%), wykazywała samodzielność. Najwięcej niezależnych pacjentów odnotowano w grupie z guzami — 138 (83,6%), następnie w grupie z tętniakiem mózgu — 63 (63,0%) i w grupie chorych z urazem — 48 (32,0%) ($p<0,05$). W dniu wypisu z oddziału zdecydowana większość pacjentów ($n=314$; 76%) była samodzielną. Wśród nich to chorzy z guzem mózgu — 127 (77,0%), z urazem — 112 (74,7%) i z tętniakiem — 75 (75,0%) ($p>0,05$).

Wnioski. Większość badanych po zabiegu neurochirurgicznym wykazuje lepszą wydolność funkcjonalną w porównaniu z okresem przed zabiegiem. Zdecydowanie lepszą wydolność funkcjonalną w dniu przyjęcia na oddział prezentowali chorzy z rozpoznaniem guza mózgu w porównaniu z chorymi urazowymi oraz z tętniakami. (PNN 2016; 5(2):46–52)

Słowa kluczowe: ocena czynnościowa, FCS, neurochirurgia

Introduction

The interests of scientists, especially in the field of medicine and health science, contemplate the functional condition of patient in recent years [1]. Proper functional capacity with good state of being and psychological attitude are the most important health indicators. Proper functional capacity is defined as the ability for independent performance and covering of basic vital needs, e.g. the control of the sphincter, nutrition, mobility and maintaining proper hygiene. The proper functional capacity of the whole system of vital activities means independence. Functional activity is tightly connected with proper morphology of particular organs and interaction of particular systems [2,3]. World Health Organization (WHO) defines health not only as the lack of an illness, but also as physical and mental well-being of a person, who can live in a satisfactory way in spite of some minor functional deficits [4,5]. According to WHO while identifying health condition, it is worth to pay attention to the functional condition [6]. WHO defines disability of function of particular system or organ (impairment) with regard to biomedical categories as permanent physical or mental defect which results in permanent dysfunction of the whole system that limits vital and professional functions (disability). Handicap is referred to as a situation when acquired limitations make it impossible for a person to perform some social roles or to adjust to surrounding and they cause lack of adaptive mechanisms [3,7].

Every therapeutic process is subject to some criteria of success evaluation. One of these is functional capacity. Precise diagnostics of functional activity of a patient is one of the main factors that determine some further therapeutic, diagnostic and rehabilitation decisions. The most important aspect of the proper assessment of functional condition is the use of a proper tool prepared by professional staff [8–10]. The recorded variety of the definitions of functional activity implies existence of different measuring tools used for the assessment of functional capacity. Functional scales used for the assessment of ability in the context of daily activities are ADL (Activity of Daily Living) and Barthel Scale. There is also a scale used for the precise assessment of func-

tional condition of a patients i.e. Functional Independent Measure — FIM. The scales used for the assessment of the functional activity in reference to motor skills are the following: Rivermead Motor Assessment, Rankin Scale, Brunnström Scale, Södring Motor Evaluation (SMES) [11]. While making the functional assessment of a patient with a damage of central nervous system, we should also regard muscle tension. The most common scales used for the assessment of spasticity are: Ashworth Scale, Tardieu Scale, Penn Scale [12]. The other measuring tool used for the assessment of functional capacity of a patient (also applied in this study) is Functional Capacity Scale (FCS). It allows for the early and precise assessment of functional condition of a patient in postoperative period [13]. FCS enables us to observe the influence of particular indicators of assessment on the final results in different periods of observation. The important aspect is how these indicators affect particular groups of patients and which of these indicators modify the functional activity of a patient [10,14].

The main aim of this study was the functional assessment of neurosurgical patients. Functional capacity was analyzed before and after surgical treatment — depending on the clinical diagnosis.

Material and Methods

Subjects

The study included the group of 415 patients hospitalized at the Clinic of Neurosurgery, Neurotraumatology and Pediatric Neurosurgery at University Hospital no 1 in Bydgoszcz.

Taking into consideration the sociodemographic data, the group included 221 males (53.3%) and 194 females (46.7%). Patients who took part in the research were aged 18–91 years, the most numerous group — 110 patients (26.5%) were people aged 51–60 years. Most of the patients (69.0%) came from urban area and 31.0% came from rural area. In the clinical context, 165 patients (39.8%) had proliferative disorder of nervous system, 150 patients (36.1%) had craniocerebral trauma

and 100 patients (24.1%) had intracranial aneurysm. The most numerous group included patients hospitalized for 4–6 days — 128 patients (30.8%). The least numerous group included patients hospitalized for 1–3 days — 64 people (15.4%). The characteristic of the group was presented in Table 1. All patients underwent one operation and were scheduled for elective surgeries.

Table 1. The characteristic of a group examined

Variable	N=415 (100%)
Gender	
Woman	194 (46.7)
Man	221 (53.3)
Age	
to 30 years	43 (10.4)
31–40 years	44 (10.6)
41–50 years	66 (15.9)
51–60 years	110 (26.5)
61–70 years	77 (18.6)
71–80 years	54 (13.0)
81 years and more	21 (5.0)
Place of residence	
Countryside	129 (31.1)
City	286 (68.9)
Clinical diagnosis	
Brain tumor	165 (39.8)
Cranio-cerebral trauma (Injuries)	150 (36.1)
Aneurysm	100 (24.1)
Hospitalization period	
1–3 days	64 (15.4)
4–6 days	128 (30.8)
7–10 days	109 (26.3)
Over 10 days	114 (27.5)

Procedure

The functional capacity of patients was assessed twice (on the day of admission — Assessment 1 and on the day of discharge — Assessment 2). Functional capacity was analyzed using Functional Capacity Scale (FCS). The direct observation with measurement technique was used.

Instruments

Functional capacity was assessed with the use of the Functional Capacity Scale (FCS), in which the deficit

of care was classified as: I group (48–40 points) — independence (self-sufficient patient), II group (39–31 points) — moderate independence (patient needs help), III group (30–21 points) — moderate dependence (patient needs significant help), IV group — 20–12 points — dependence (patient needs intensive care).

Statistical Analysis

All calculations and figures were prepared using Microsoft Excel and Statistica version 10.0. A descriptive analysis of the results is presented in tables and figure. Means (\bar{x}) with standard deviations (SD) were calculated. Test 2 was applied to measure the difference between groups and Kruskal–Wallis one-way analysis of variance by ranks was used to compare mean values of the variables. Statistically significant level of significance was $p \leq 0.05$.

Ethical Approval

The study obtained consent of the Bioethics Commission of the Nicolaus Copernicus University in Toruń at Ludwik Rydygier Collegium Medicum in Bydgoszcz (KB no. 564/2014).

Results

Analyzing the functional capacity of patients on the day of admission (Table 2), most of the participants were classified as group I — independent — 249 patients (60.0%). The least numerous group of patients included those who belong to group IV — of total dependence — 15 patients (3.6%). Most of the independent participants were in the group of patients with tumors — 138 patients (83.6%), the smallest number of self-reliant participants was in the group of patients with trauma — 48 patients (32.0%). The obtained difference was statistically significant ($p < 0.05$).

Analyzing the functional capacity of patients on the day of discharge (Table 3), most of the participants were in group I — independent — 314 patients (75.7%). The smallest number of participants was in group IV — total dependence — 12 patients (2.9%). Most of the independent patients were in a group of patients with tumors — 127 patients (77.0%), the lowest number referred to the patients with trauma — 112 patients (74.7%). The obtained difference was statistically significant ($p > 0.05$).

Taking into consideration the clinical diagnosis and functional capacity of patients in the period of neurosurgical treatment (Table 4 and Figure) it was observed

Table 2. Functional capacity on the day of admission

FCS	Injuries		Tumors		Aneurysms		Total	
	N	%	N	%	N	%	N	%
I group	48	32.0	138	83.6	63	63.0	249	60.0
II group	59	39.3	20	12.1	24	24.0	103	24.8
III group	29	19.3	7	4.2	12	12.0	48	11.6
IV group	14	9.3	0	0.0	1	1.0	15	3.6
Total	150	100.0	165	100.0	100	100.0	415	100.0

$\chi^2=90.437$; $p=0.000$

Table 3. Functional capacity on the day of discharge

FCS	Injuries		Tumors		Aneurysms		Total	
	N	%	N	%	N	%	N	%
I group	112	74.7	127	77.0	75	75.0	314	75.7
II group	23	15.3	32	19.4	20	20.0	75	18.1
III group	6	4.0	5	3.0	3	3.0	14	3.4
IV group	9	6.0	1	0.6	2	2.0	12	2.9
Total	150	100.0	165	100.0	100	100.0	415	100.0

$\chi^2=0.631$; $p=0.729$

Table 4. Clinical diagnosis and functional capacity

Clinical diagnosis	Admission day			Discharge day		
	N	\bar{x}	SD	N	\bar{x}	SD
Injuries	150	34.41	9.855	150	41.87	9.414
Tumors	165	43.72	5.246	165	43.07	6.077
Aneurysms	100	40.77	8.380	100	42.95	6.869
Total	415	39.64	8.916	415	42.61	7.623

Kruskal–Wallis test=79.563; 0.000

Kruskal–Wallis test=2.303; 0.316

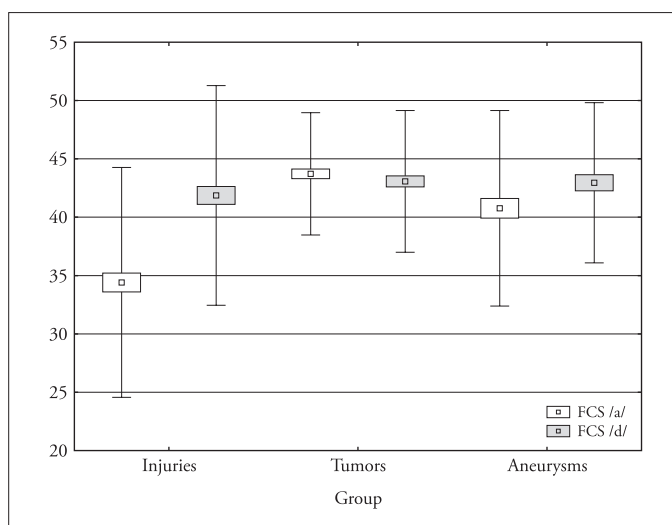


Figure. Clinical diagnosis and functional capacity in the period of neurosurgical treatment

that the highest score on the admission day was obtained by patients with brain tumors — 43.72 points. The lowest result was obtained by patients with trauma — 34.41 points. It was observed that on the day of admission, there is a statistically significant difference ($p<0.05$) between the analyzed groups (patients with tumors, trauma, aneurysm) and the results of FCS. On the day of discharge, the highest score was obtained by the group of patients with tumors — 43.07 points (even though, lower when compared to the day of admission). The lowest result was obtained by patients with trauma — 41.87 points. In the case of patients with trauma and aneurysm — the FCS results increased when compared with the admission day). On the day of discharge, there was no statistically significant difference between particular groups of patients ($p>0.05$).

Discussion

The main aim of this study was the functional assessment of patients in the period of neurosurgical treatment. Functional capacity was analyzed before and after surgical treatment — depending on the clinical diagnosis. The assessment indicators were the following criteria: mobility (ability to move), nutrition, hygiene activities and physiological needs. Nishino et al. [15] and Zderkiewicz and Lorencowicz [16] claim that beside the ability to perform daily activities, the main indicator of the success reports of surgical treatment is a return to an active professional life. The results obtained among 193 patients with SAH by Nishino et al. [15] show that the return to professional life does not only depend on medical factors, but also refers to social condition, sex, and type of activity. The research carried out Lorencowicz and Zderkiewicz [17], including 87 patients after surgical treatment of intracranial aneurysm appear to confirm the results obtained by the authors of this study. Among the participants, nearly 63.2% were independent in the aspect of self-reliance on the day of discharge from hospital. Authors claim that return to independence is most dynamic in the early period of hospitalization and just after returning home. What is more, Saciri et al. [18] observed that in 72.7% patients there were no coordination disorders diagnosed on the day of discharge. In the research by Deruty et al. [19] 85% of participants obtained good and medium score and 4% obtained low score. The research by Rutkowska et al. [20] included 50 participants after surgical treatment of intracranial aneurysm. 42% participants were independent on the day of discharge. Hütterer et al. [21] assessed the quality of life of 116 patients after surgical treatment of aneurysm. Patients who underwent an operation on middle cerebral artery complained about difficulties in social contacts, communication and cognitive functions. Mahaney et al. [22] showed that the condition of 42.6% among 1001 patients worsened significantly after surgical treatment. Whereas, Otawara et al. [23] examined patients after surgical treatment of SAH with no damage in cerebral aneurysm and noted that patients with SAH have considerably lower cognitive functions.

The functional analysis of patients with brain tumor showed that on the day of admission group I included 249 participants, which is 60% of the examined group. On the day of discharge there were 127 participants belonging to group I. On the day of discharge most of the independent patients were in a group of patients with tumors — 127 participants. The research carried out by Ferroli et al. [24] on 746 participants (53.2% women, average age 51.3 ± 17.1) with proliferative disorder of central nervous system (OUN) seem not to confirm the results obtained by the authors of this study. Among 746 patients who underwent surgical treatment, the

functional capacity of 523 (70.1%) improved or stayed at the same level, whereas, the functional capacity of 223 patients (29.9%) worsened. Bekelis et al. [25] carried out retrospective study on 19,894 participants after resection of intracranial tumor. The obtained results correlate with the results noted by the authors of this study. In the postsurgical period, the functional condition of patients was lower, which mostly results from postoperative complications. In the study of Schiavolina et al. [26] including 198 patients with brain tumors, cerebrovascular and spine diseases there was also observed a fall of functional capacity in postsurgical period. Among oncological and cerebrovascular groups there were considerably lower scores in functional activity in comparison with patients with spine diseases. Drewes et al. [27] examined the quality of life with the use of EQ-5D-3L. The research included 241 patients with intracranial tumors before and after surgical treatment. The average indicator of EQ-5D-3L before operation was 0.73 (range from -0.24 to 1.00) in patients with right-side tumors and 0.76 (range from -0.48 to 1.00) in patients with left-side tumors. There was no statistically significant change in the quality of life of patients ($p=0.793$) after operation. Also in the research carried out by Yano et al. [28] with the use of SF-36 form 26 participants had considerably lower scores in functional and psychological condition after operation. Kos et al. [29] indicate in their study that the assessment of functional condition in patients with proliferative disorder of central nervous system should be done with more precision both before and after oncological treatment. The identification of functional activity is one of the main factors that determine further complex treatment of a patient.

The research carried out on 415 patients showed that the lowest number of independent patients both before (32.0%) and after operation (74.7%) belong to a group of patients with craniocerebral injuries. The important fact is that scores of FCS increased on the day of discharge when compared to the day of admission. Similar results were obtained by the following authors: Zadrożna et al. [30], Rosińczuk-Tonderys et al. [31]. Most of the patients with mild craniocerebral injuries recover within the period from a few days to a few weeks [32]. Literature reviewed by Leonard et al. showed that electrolyte disturbances considerably slow down the process of recovering among patients with craniocerebral injuries [33]. The research carried out on 120 participants by Chen [34] et al. showed that the functional activity of patients after surgical treatment increases. Both Chen et al. [34] and Konn [35] underline that patients with an early enteral nutrition had better results in the assessment of functional capacity and less complications. In spite of the introduction of new diagnostic and therapeutic methods, brain injury remains one of the most common

causes of death and disability all over the world. The period of functional capacity recovery is longer, as the seriousness of an injury increases [36,37].

Conclusions

1. Most of the patients show better functional capacity after neurosurgical treatment than before it.
2. Patients with brain tumors showed considerably better functional capacity on the day of admission when compared with patients with trauma or aneurysm.

Implications for Nursing Practice

This paper presents the functional assessment of patients with diagnosed proliferative disorder of nervous system, craniocerebral trauma and intracranial aneurysm in the process of neurosurgical treatment. The knowledge of these issues will allow nurses for appropriate prioritization of patients' needs. On the basis of the analysis of functional activity of patients both before and after an operation, we can conclude that the assessment of functional capacity should be an integral part of diagnosis and nursing care. To a large extent, it should influence selection and planning and would enable to classify patients within the groups of deficit of care.

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