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Functional problems after surgical treatment of spine fractures

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Abstract

Introduction: Despite the large amount of research on the spine injuries themselves and on methods of their treatment, there are only a few reports of functional problems faced by patients after surgical treatment of these injuries.

Aim: The aim of the study was to demonstrate the occurrence of functional problems and determine their type in patients after surgical treatment of spinal injuries, to determine the impact of the severity of the injury on the occurrence of dysfunctions, to determine the impact of patients' health and fitness on the occurrence of functional problems and coping with them, to demonstrate the relationship between the mental state and the occurrence of dysfunction, determination of the impact of pain on the occurrence of functional problems, assessment of the degree of coping with dysfunctions.

Materials and methods: The study included a group of 20 people (13 men and 7 women) treated surgically at the Department of Neurosurgery, Nicolas Copernicus University Collegium Medicum in Bydgoszcz, due to a spine injury. The average age of the respondents was 44.6 years. The research consisted of patient answering the questions included in the patient's questionnaire, subjective descriptive test of pain intensity, modified Barthel scale and determination of pain intensity on the VAS scale. The investigator also completed an additional questionnaire in order to obtain additional information about the patient's health.

Results: Research results indicate pain as the main cause of postoperative dysfunction. They concern self-service activities, travel, sleep and social life.

As it has been shown on the basis of research, the quality of coping with functional problems depends on factors such as physical fitness, the activity of daily life before the injury, the presence of comorbidities, mental attitude and the severity of the injury.

Key words: functional problems; spine fractures; pain

Introduction

Spine injuries, although they are less common than injuries to the limbs, skull or chest, are a serious treatment problem. This is due not only to the injury of its structures, but also to frequent damage to the nerve elements contained in the spinal canal, with periodic or permanent neurological defects, including tetraplegia or transverse paralysis. The higher the spine injury and the deeper its damage, the more severe are its consequences. Regardless of the severity of the injury, conservative treatment is initially carried out. Its ineffectiveness requires surgical treatment.

Despite the large amount of research on the spine injuries themselves and on methods of their treatment, there are few reports of functional problems faced by patients after surgical treatment of these injuries. It is the issues of postoperative dysfunctions, their causes, types and coping with them that are the subject of this work.

The aim of the study was:

1. Demonstration of the occurrence of functional problems and determination of their types in patients treated surgically due to spine injury.
2. Determining the impact of the severity of the injury on the occurrence of functional problems.
3. Determining the influence of the health and fitness level of patients before the injury on the occurrence of functional problems and coping with them.
4. Demonstration of the relationship between the mental state of patients and the occurrence of functional problems.
5. To determine the impact of pain on the occurrence of functional problems.
6. Assessment of the degree of coping with functional problems.

Materials and methods

The study involved 20 patients (13 men and 7 women) treated surgically at the Department of Neurosurgery, Nicolas Copernicus University Collegium Medicum in Bydgoszcz, due to a spine injury. Most of the respondents, as much as 65%, were men. The mean age was 44.6 years, with the mean age of women 51.9 years and men being 43.2 years. The youngest person that under study was 20 years old and the oldest was 69 years old. 70% of the respondents were city residents, and 30% were countryside residents. As many as 60% of the respondents had vocational education. People with higher education accounted for 15%, and 20% with secondary education. Only 5% of the respondents had primary education. 80% of the respondents are professionally active people. 20% of the research group were people on disability or retirement.

The research consisted of the patient answering the questions included in the patient's questionnaire, subjective descriptive test of pain intensity, modified Barthel scale and determination of pain intensity on the VAS scale. The researcher also completed an additional questionnaire.

The patient questionnaire contained 22 self-authored questions. The first 10 questions concerned general information about the patient and his physical condition before the injury.

The next 5 were to familiarize themselves with the circumstances of the injury and the accompanying ailments and disorders. The last 7 questions describe the patient's stay in hospital from admission to discharge from the ward.

The subjective descriptive test of pain intensity with specific activities consisted of 8 questions. They were aimed at determining the impact of pain on the daily functioning of the patient and concerned, in turn, the intensity of pain, personal hygiene, walking, sitting, standing, sleeping, social life and changes in the level of pain.

The Modified Barthel Scale is a standard functional scale that determines the patient's independence in performing basic daily activities. It contained 11 questions on personal hygiene, bathing, eating, restroom, climbing stairs, dressing, bladder control, defecation control, walking / using a wheelchair and chair-to-bed transfers.

The visual analog pain scale VAS is a standard scale for assessing pain severity. On a 10 cm section of the scale, the patient defined the intensity of the pain he felt, where 0 was no pain and 10 was unbearable pain (the strongest imaginable).

The supplementary questionnaire contained 10 self-written questions. Its purpose was to obtain additional information on trauma, surgery and postoperative management.

Results

Half of respondents had an active lifestyle before the spine injury (Table 1). However, large disproportions between the activity of the lifestyle of women and men can be noticed - 4 out of 7 of the surveyed women described their lifestyle as not very active, and 9 out of 13 men as active. Before the injury, 40% of the respondents assessed their fitness level as good, including 3 out of 7 women and 5 out of 13 men. 46.2% of the men described him as very good. 60% of the subjects (4 out of 7 women and 8 out of 13 men) had no comorbid disease. The most common disease in men and in general was hypertension. 42.9% of women had a comorbidity other than those mentioned in the question. Among the respondents, the most frequent injury factor was a car accident (45% of patients). 42.9% of women gave a circumstance other than that mentioned in the answers. 53.8% of men indicated a car accident. As many as 80% of the respondents (6 out of 7 women and 10 out of 13 men) experienced spontaneous pain in the spine and / or the surrounding area after the injury. Only 5% of patients did not experience any symptoms. After the injury, 85% of the subjects had no sensory disturbances in the upper limbs. Half of the respondents had no sensory disturbances in the lower limbs after the injury. The most common dysesthesia of the lower extremities, both in men and women (altogether in 35% of patients), was numbness. Most of the respondents, 45%, had a spine injury at the L level. Among women, the most common level of injury was the level of Th and L, and among men C and L. 45% of the respondents did not feel any changes in their emotional state after the surgery. Among women, the most common symptoms were anxiety (28.6%) and nervousness (28.6%). Among men it was depression (30.8%). During their stay in hospital, only 3 out of 20 respondents did not receive support and help from relatives. After the surgery, orthopedic equipment was used in only 30% of the respondents.

Table 1. Own questionnaire.

	number of respondents (n=20)	M	F
lifestyle before the injury			
active	10	9	1
moderately active	4	2	2
not very active	6	2	4
pre-injury fitness level			
very good	6	6	0
good	8	5	3
average	4	2	2
low	2	0	2
comorbidities			
diabetes	1	0	1
hypertension	5	5	0
atherosclerosis	1	1	0
COPD	1	0	1
other	4	1	3
two comorbidities	4	2	2
none	12	8	4
circumstances of the injury			
car accident	9	7	2
motocycle accident	1	1	0
fall from a height	5	3	2
other	5	2	3
ailments after the injury			
spontaneous pain in the spine and / or the surrounding area	16	10	6
palpation pain in the spine and / or the surrounding area	5	4	1
limitation of the mobility of the spine	7	5	2
other	1	1	0
two ailments	7	4	3
three ailments	3	2	1
none	1	1	0
type of disorder in the upper extremities			
no sense of touch	0	0	0
decreased sense of touch	1	1	0
numbness	2	1	1
formication	1	0	1
paresis	1	1	0
paralysis	0	0	0
other	0	0	0
two disorders	2	1	1
none	17	11	6

type of disorder in the upper extremities			
no sense of touch	0	0	0
decreased sense of touch	2	1	1
numbness	7	3	3
formication	5	4	2
paresis	3	2	1
paralysis	0	0	0
other	3	2	1
two disorders	3	2	1
three disorders	3	2	1
none	10	7	3
level of injury			
C	7	6	1
Th	4	2	3
L	9	6	3
emotional state after the surgery			
fear	3	1	2
depression	5	4	1
nervousness	2	0	2
gaiety	1	1	0
does not feel changes	9	7	2
support and help from relatives			
yes	17		
no	3		
orthopedic equipment after surgery			
collar	4	1	3
corset	2	0	2
walker	0	0	0
crutches	0	0	0
other	0	0	0
none	14	12	2

35% of the respondents were independent and did not require the help of others during personal hygiene (Table 2). 42.9% of women needed moderate help. 46.2% of the men were independent. 35% of the respondents were independent and did not require the help of others while bathing. As many as 57.1% of women needed significant help. 46.2% of the men were independent and 30.8% completely unable to perform the task. 60% of the respondents were independent and did not require the help of others while eating. 40% of respondents were independent and did not need the help of others during the toilet. 70% of respondents were completely unable to climb stairs. 21.3% of men were independent. 14.3% of women required minimal assistance. 30% of the respondents were independent and did not require the help of others. The same number of patients required significant assistance. Among men, 38.5% were independent. Among women, 57.1% required significant help from others. 80% of the subjects were independent and did not require the help of others in bladder control and defecation. 40% of the respondents were independent and did not require the help of others while walking. 30% of the respondents were independent and did not require the help of others during chair-to-bed transfers. 25% of patients were unable to complete the task. The same required a lot of help during the transfers. Of the men, 38.5% were independent as well as completely unable to complete the task. Of the women, 42.9% required significant help.

Table 2. Modified Barthel Scale.

	Number of respondents (n=20)	M	F
personal hygene			
inability to complete the task	1	1	0
requires a lot assistance	4	3	1
requires moderate assistance	5	2	3
requires minimal assistance	3	1	2
fully independent	7	6	1
bath			
inability to complete the task	4	4	0
requires a lot assistance	6	2	4
requires moderate assistance	2	1	1
requires minimal assistance	1	0	1
fully independent	7	6	1
eating			
inability to complete the task	1	1	0
requires a lot assistance	1	1	0
requires moderate assistance	3	3	0
requires minimal assistance	3	0	3
fully independent	12	8	4
toilet			
inability to complete the task	2	2	0
requires a lot assistance	4	3	1
requires moderate assistance	2	0	2
requires minimal assistance	4	2	2
fully independent	8	6	2
walking the stairs			
inability to complete the task	14	8	6
requires a lot assistance	1	1	0
requires moderate assistance	0	0	0
requires minimal assistance	2	1	1
fully independent	3	3	0
dressing up			
inability to complete the task	4	4	0
requires a lot assistance	6	2	4
requires moderate assistance	2	1	1
requires minimal assistance	2	1	1
fully independent	6	5	1
bladder control			
inability to complete the task	0	0	0
requires a lot assistance	2	2	0
requires moderate assistance	1	1	0
requires minimal assistance	1	1	0
fully independent	16	9	7

defecation control			
inability to complete the task	0	0	0
requires a lot assistance	2	2	0
requires moderate assistance	2	2	0
requires minimal assistance	0	0	0
fully independent	16	9	7
walking			
inability to complete the task	2	2	0
requires a lot assistance	4	3	1
requires moderate assistance	2	0	2
requires minimal assistance	4	2	2
fully independent	8	6	2
bed-chair transfers			
inability to complete the task	5	5	0
requires a lot assistance	5	2	3
requires moderate assistance	2	1	1
requires minimal assistance	2	0	2
fully independent	6	5	1

25% of the respondents gave the level of pain severity 5 on a scale from 0 to 10 (Table 3). The same number of patients rated their pain as 8. Among men, 30.8% reported the level of pain severity as 5. 42.9% of women rated their pain as 6, such the amount alone gave it an 8.

Table 3. Pain intensity level on the VAS scale.

Pain level	Number of respondents (n=20)	M	F
0	0	0	0
1	0	0	0
2	1	1	0
3	1	1	0
4	1	1	0
5	5	4	1
6	4	1	3
7	2	2	0
8	5	2	3
9	1	1	0
10	0	0	0

25% of respondents described the perceived pain as moderate and unchanging (Table 4). 57.1% of women rated their pain in the same way. 30.8% of men reported pain as very mild and it comes and goes. 45% of respondents could not wash / dress without help due to pain. 35% of respondents spent most of their time in bed due to pain, and it was difficult for them to go to the toilet. 10% of patients were bedridden. In 40% of respondents, pain made it impossible to sit for more than 10 minutes. The same answer was given by 85.7% of women. 46.2% of men were unable to sit due to pain. 40% of respondents avoided standing because it caused them pain from the very beginning. 10% of patients were bedridden. 30% of respondents felt pain in bed, but it did not make it difficult for them to sleep. The same number of pain patients had their normal sleep time reduced by about half. In 30.8% of men, pain in bed reduced sleep by about and in the same amount by. Among women, 42.9% felt pain in bed, but it did not reduce sleep time. 45% of the respondents had a limited social life because of pain. In 30% of respondents, the pain subsided quite quickly. 38.5% of men answered the same. Among 42.9% of the women, the pain appeared to be improving, but improvement was slow.

Table 4. Subjective Descriptive Pain Severity Test.

	Number of respondents (n=20)	M	F
pain intensity			
comes and goes, it's very gentle	4	4	0
gentle and does not change	1	1	0
comes and goes, it is moderate	2	2	0
moderate and does not change	5	1	4
comes and goes, it is severe	4	2	2
severe and does not change	4	3	1
personal hygene			
I don't need to change the way I wash / dress to avoid pain	4	4	0
I usually don't change the way I wash / dress, even if it causes pain	3	2	1
washing / getting dressed increases the pain, but I manage not to change the way these activities are performed	0	0	0
washing / dressing increases the pain and I am forced to change the way I do these activities	4	2	2
because of the pain I cannot wash / dress without help	9	5	4
walking			
the pain does not restrict me from walking any distance	5	4	1
the pain prevents me from walking longer than the length of the corridor	4	2	2
the pain prevents me from walking more than the length of the room	2	1	1
I can only walk with a cane / crutch / walker	0	0	0
I spend most of my time in bed, going to the toilet is difficult for me	7	4	3
lying patient	2	2	0
sitting			
I can sit as long as I want without pain	2	2	0
I can sit for as long as I want with minimal pain	3	2	1
pain prevents me from sitting for more than 1 hour	0	0	0
pain prevents me from sitting for more than 30 minutes	1	1	0
pain prevents me from sitting for more than 10 minutes	8	2	6
the pain makes it completely impossible for me to sit	6	6	0

standing			
I can stand as long as I want without pain	1	1	0
I get some pain when standing, but it doesn't increase with time	2	2	0
I cannot stand for more than 30 minutes without increasing pain	2	1	1
I cannot stand for more than 15 minutes without increasing pain	3	2	1
I cannot stand for more than 5 minutes without increasing pain	2	1	1
I avoid standing because it hurts from the very beginning	8	4	4
lying patient	2	2	0
sleeping			
I have no pain in bed	1	1	0
I have pain in my bed, but it does not make it difficult for me to sleep	6	3	3
because of the pain, my normal sleep time is reduced by about 1/4	2	1	1
because of the pain, my normal sleep time is reduced by about 1/2	6	4	2
because of the pain, my normal sleep time is reduced by about 3/4	5	4	1
the pain completely prevents me from sleeping	0	0	0
social life			
my social life is normal and it does not give me pain	7	5	2
my social life is normal but it increases the pain level a bit	3	2	1
pain has no significant effect on my social life, except to limit its more active aspects	1	0	1
pain limits my social life	9	6	3
changing pain levels			
the pain subsides fairly quickly	6	5	1
the pain changes, but still gets better	2	2	0
the pain seems to ease but improvement is now slow	5	2	3
the pain neither increases nor decreases	2	1	1
my pain is getting worse gradually	4	2	2
the pain worsens rapidly	1	1	0

Discussion

Based on the conducted research, it was found that functional problems occur in all subjects who underwent surgical treatment of spinal injuries. However, they are of different degrees and depend on various factors.

It has been noticed that men suffer more spine injuries. McLain also obtained similar results [1]. The most common level of spine injury is the lumbar region [2]. This opinion is consistent with the opinion of most authors of studies on spinal injuries. However, they very often combine injuries of the lumbar spine with injuries of the thoracic section, stating in their studies the occurrence of trauma to the thoracolumbar section [3, 4, 5, 6]. According to research, car accidents are the most common cause of spinal injury. Falls from heights are second. Based on the conducted research, it was found that the main pain in the spine immediately after the injury is spontaneous pain in the spine and / or its surroundings. Mobility is restricted to a lesser extent. Often, patients report two or more complaints. As for the type of neurological disorder after an injury, it depends on its level and the extent of the damage to the nerve structures. Research indicates that the vast majority of patients did not have any sensory disturbances in the upper limbs, and half did not have such symptoms in the lower limbs. The most common sensory disturbance is numbness. It was noticed that people with a greater degree of injury severity, including those with neurological complaints, had a much greater degree of functional problems after undergoing surgery than the rest of the respondents.

Half of the patients declare an active lifestyle prior to spine injury and assess their fitness level as very good or good. Most women describe their lifestyle as not very active and declare poor or moderate fitness. In most cases, however, it is associated with the general poor health of patients prior to spine injury. Research shows that more than half of the patients do not have any comorbid disease. The most common disease is arterial hypertension, which is consistent with the data on the incidence of civilization diseases in Poland. Based on the results of the research, it was noticed that patients with an active lifestyle, with very good or good physical fitness and not suffering from any disease, declare the occurrence of less ailments and cope with them much better than other respondents.

After the surgery, almost half of the respondents did not experience any changes in mood. However, most of the patients reported depression, anxiety or nervousness. The vast majority of respondents received support and help from their relatives after the surgery. People who did not receive such support and those declaring a depressed mood coped much worse with functional problems.

The results of the Modified Barthel Scale show that most patients are incapable of self-grooming, bathing, toilet, stair climbing, dressing, walking, and chair-to-bed transfers, and require varying degrees of help from others. Only during eating, bladder control and defecation do the majority of respondents show independence.

The vast majority of patients rate the severity of postoperative pain on the 10-point VAS scale (where 0 is no pain and 10 is unbearable pain) at 5 or more. The analysis of the results of the subjective descriptive test of pain intensity shows that more than half of the respondents, while performing self-service activities, traveling, social life and sleeping, while performing a given task, describe the pain the least as moderate and prevent it from being performed satisfactorily. This allows us to conclude that the main cause of functional problems in this group of patients is pain, and its intensity determines the degree of coping with dysfunctions. Therefore, proper postoperative management in the form of pharmacotherapy of pain is very important, which is confirmed by many authors of studies on pain management [7, 8, 9].

Conclusions

1. Functional problems occur in all subjects after surgical treatment of spinal injuries. They concern self-service activities, mobility, sleep and social life.
2. The severity of the spine injury has a significant impact on the severity of the functional problems. The more severe the trauma, the greater the dysfunction of the respondents.
3. Patients who had some chronic disease before their trauma and had well-programmed treatment do not report more functional problems than those who did not. The level of fitness and active lifestyle are of great importance in coping with the existing dysfunctions. Respondents with a very good or good level of fitness, leading an active lifestyle, declare that they have less functional problems than people with an average or poor level of fitness, who lead a less active lifestyle.
4. Patients declaring a lack of support and help from their relatives and a depressed mood after surgery have greater functional problems than people with a positive attitude. Lack of motivation causes worse coping with dysfunctions and slower recovery.
5. The presence of pain after surgery is the main cause of functional problems among respondents.

6. Almost half of the respondents declare independence when performing activities listed in the modified Barthel scale. The remaining patients require varying degrees of help.

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