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Posterior pusher syndrome – case report

Case report

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Abstract: Pusher syndrome is classically described as disorder of body orientation in the coronal plane. It is characterized by a tilt towards the contralesional paretic side and a resistance to external attempts to rectify. It occurs mainly in stroke patients, however, non-stroke causes have been described too. In 2010 the concept of the posterior pusher syndrome had been proposed, defined as disturbance of body orientation in the sagittal plane with imbalance, posterior tilt and an active resistance to forward pulling or pushing. The author describes, on the basis of the literature and own research, symptoms and methods of the treatment of the little-known posterior pusher syndrome.

Keywords: *Stroke • Pusher syndrome • Posterior pusher syndrome • Body orientation*

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1. Introduction

Pusher syndrome is clinical disorder of body orientation in the coronal plane [1]. It is characterized by tilt (20-35 degrees) towards the contralesional paretic side [1-5]. Resistance to passive external correction of posture to an upright position is an important symptom of pusher syndrome [1-5]. Despite occurs mainly in post-stroke patients (following focal lesions in the posterior thalamus, insula, postcentral gyrus, etc.), however, non-stroke causes have been described. The percentage of cases caused by right hemisphere lesions is 47%, with respect to 53% of the left hemisphere lesions [2,4,5]. Not all patients with lesions in the posterior thalamus, insula or postcentral gyrus areas demonstrated pushing behaviour. Patients with pusher syndrome maintain vestibular and visual functions [5]. The incidence of pusher syndrome is estimated to be between 10 % and 27% [6], but the number of misdiagnosed cases is not known. Pushing behaviour, even in 80% of cases, can be associated with hemispatial neglect [6].

In 2010 Cardoen et al. [7] had proposed the widely discussed [8] concept of posterior pusher syndrome. It is defined as disturbance of body orientation in the sagittal plane with imbalance, posterior tilt and an active resistance to forward pulling or pushing. There is no further, significant evidences in the area of posterior pusher syndrome [7,8].

In the therapy of "classical", contraversive, pusher syndrome it is important to quickly establish the correct diagnosis and begin early treatment. Symptoms of the pusher syndrome, in selected cases, can fade in up to 6 months. Misdiagnosed pusher syndrome can delay the results of the rehabilitation approximately 1-3 months [9-11] compared to subjects without pusher syndrome. Early diagnosis and therapy seem a necessity. Basic examination tools for pusher syndrome are as follows:

- Scale for Contraversive Pushing (SCP),
- Modified Scale for Contraversive Pushing (MSCP),
- Burke Lateropulsion Scale (BLS) [2-4,12,13].

SCP is a perceived quick, simple, and most popular examination tool, but there is a need for further investigation [12,13]. Larger, more diverse samples should be used to better delineate its responsiveness and other clinimetric properties [12].

2. Case Report

The patient was a 72-year-old male, who presented six weeks after a first-ever ischemic stroke in the right hemisphere. Clinical status of the patient is summarized

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Table 1. Clinical status of the patient.

criteria	score / result
National Institutes of Health Stroke Scale (NIHSS)	17
muscular strength (Lovett Scale): left upper limb right upper limb left lower limb right lower limb	 0 3 0 3
aphasia	mild
neglect	left side
ataxia	none
level of conscience: consciousness' disorders Glasgow Coma Scale (GCS)	 moderate 9, 2/4 + 3/5 + 4/6
other	left side of the body
diagnosed risk factors	hypertension, heart failure

Table 2. Scale for Contraversive Pushing (SCP) results for posterior pusher, taking into account changed direction of pushing/tilt

Scale for Contraversive Pushing, taking into account changed direction of pushing/tilt	sitting		standing	
	before therapy	after therapy	before therapy	after therapy
A. Posture (symmetry of spontaneous posture)				
Score 1 = severe tilt with falling backwards	1		1	
Score 0.75 = severe tilt without falling backwards		0.75		
Score 0.25 = mild tilt without falling backwards				0.25
Score 0 = no tilt/upright body orientation				
B. Extension (use of the arm/leg to extend the area of physical contact to the ground)				
Score 1 = performed already in rest	1		1	1
Score 0.5 = performed only until position is changed		0.5		
Score 0 = no extension				
C. Resistance (resistance to passive correction of posture to an upright position)				
Score 1 = resistance is shown	1		1	
Score 0 = resistance is not shown		0		0
TOTAL (A+B+C)	3	1.25	3	1.25

in Table 1. Additional examination using SCP was performed due to symptoms of pusher behaviour.

"Classical" pusher syndrome was diagnosed, but symptoms of posterior pusher syndrome were recognized (SCP score = 3, both sitting and standing, table 2) associated with hemispatial neglect. Main symptoms of the observed posterior pusher syndrome were as follows: active powerful pushing the trunk backwards against the seat using healthy upper limb and healthy lower limb [7,8]. There were observed the same symptoms while standing, or walking (attempts only). SCP, taking into account changed direction of pushing/tilt, was used as examination tool (Table 2).

A therapeutic approach was introduced, similar to this described by the author in cases of "classical" contraversive pusher syndrome [2-4], taking into account the changed direction of pushing/tilt. The basic rules are similar to the contraversive pusher syndrome therapy:

- patient and his/her family/care-takers education is necessary to increase patient's motivation and improve patient-therapist relationship,
- the substantial amount of practical visual cues–vertical elements (including furniture, long lighting sticks, etc.) should be provided in the environment,
- in most cases patient can actively correct his/her posture thanks to preserved visual control and vertical reference marks,
- therapist's or family verbal stimulation helps to keep patient in upright position thanks to conscious postural control strategy,
- temporary alignment of patient's body axis can be trained this way,
- individualized patient-centered therapy can permanently improve condition of the patient.

Figure 1. Posterior tilt of the trunk.

In the sitting position, body weight is distributed in the sagittal plane with the trunk flexed forward. Standing and walking re-education was not possible because patient should achieve proper sitting beforehand. Additionally, patient lays down on a hard surface, 15 minutes three times a day (possible in patients with efficient breathing apparatus). This way can be good to extinguish posterior pusher syndrome while lying.

After two weeks (ten sessions) of the therapy there was an observed extinction of symptoms of the posterior pusher syndrome (SCP score = 1.25, both sitting and standing, Table 2). Previously reported tendency to fall backwards could no longer be demonstrated. (Figure 1)

No studies including bigger amounts of patients have been done to provide more reliable data.

3. Discussion

Pusher syndrome is perceived as a little-known neurological disorder [5]. A critical appraisal of publications has been carried out, based on the PubMed database [14]. Results of the investigation showed only 25 articles since 1996: one clinical trial [14], seven letters and five reviews. There are no randomized contolled trials, practice guidelines and meta-analysis. There are very few reports investigating ways of the therapy [1-4]. Twenty-three of investigated articles concerned "classical" pusher syndrome (i.e. in coronal plane). My three previous articles [2-4] confirmed observations and conclusions of other cited scientists and clinicians.

Only two articles concerned posterior pusher syndrome (i.e. in saggital plane) – report of two cases and letter [7,8]. Hypotheses discussed on the role of the graviceptive system and aspecific subcortical-frontal dysfunction are perceived as purely speculative. There is no general consensus even in the area of terminology. This case report presents posterior pusher syndrome observed in clinical conditions. This experience seems useful in the other cases of the posterior pusher syndrome. The present study, due to poor scientific evidence, was conducted to evaluate of the possible influence of rehabilitation to posterior pusher syndrome.

Although the presented syndrome is rare, it should be better studied and decribed in the literature. Low reported incidence can be associated with possible misdiagnosed cases.

The presented case report pays special attention to proper diagnosis and early beginning of the rehabilitation, both in the "classic" contraversive pusher syndrome and posterior pusher syndrome. It can be true, that the therapy of posterior pusher syndrome can be a useful and effective therapeutic approach similar to the one used in "classical" pusher syndrome [2-4], but taking into account a change in the direction of pushing/tilt. Rare cases of both types of pusher syndrome have been observed in the same patient, even associated with with hemispatial neglect, which makes diagnosis and therapy more difficult. The potential pathophysiological mechanism and the prognosis of posterior pushing are unclear so far.

Due to poor scientific evidence, it should be noted that a clinical picture of the different types of pusher syndrome can be caused by more than one mechanism, making a "pusher spectrum of disorders" possible.

The therapy seems to be effective, but needs further investigation. The clinical picture of the posterior pusher syndrome may change depending on the clinical status of the patient, place of lesion, age, etc. Ways of therapy need to be explored for more varieties of treatments for other cases.

In conclusion, the presented clinical picture of posterior pusher syndrome, though uncommon, and proposed therapy can be useful for clinicians to provide proper diagnosis and effective ways of therapy. The results of the author's research can be perceived as interesting, but since it is only a single case, further investigation should be performed to confirm the observations, especially their clinical relevance and underlying pathophysiological mechanisms. More research like this is needed for better understanding this complex syndrome.

References

[1] Davies P.M., Steps to follow: A guide to the treatment of adult hemiplegia, 1st ed., Springer, New York, 1985

[2] Mikołajewska E., Zespół pushera – diagnostyka i rehabilitacja – opis dwóch przypadków, Valetudinaria, 2007, 12, 1, 58-60, (in Polish)

[3] Mikołajewska E., Przykład terapii metodą NDT-Bobath pacjentów z hemiplegią z rozpoznaniem zespołu odpychania, Praktyczna Fizjoterapia i Rehabilitacja, 2010, 11, 21-23, (in Polish)

[4] Mikołajewska E., Rozpoznanie i rehabilitacja zespołu odpychania, Praktyczna Fizjoterapia i Rehabilitacja, 2010, 9, 56-59, (in Polish)

[5] Karnath H.O., Pusher syndrome–a frequent but little-known disturbance of body orientation perception, J. Neurol., 2007, 254, 4, 415-424

[6] Karnath H.O., Jahanssen L., Broetz D., et al.,

Posterior thalamic hemorrhage induces “pusher syndrome”, Neurology, 2005, 64, 6, 1014-1019
[7] Cardoen S., Santens P., Posterior pusher syndrome: A report of two cases, Clin. Neurol. Neurosurg., 2010, 112, 4, 347-349
[8] Santos-Pontelli T.E., Pontes-Neto O.M., Leite J.P., ‘Posterior pusher syndrome’ or ‘psychomotor disadaptation syndrome’?, Clin. Neurol. Neurosurg., 2011, 113, 6, 521
[9] Honoré J., Saj A., Bernati T., et al., The pusher syndrome reverses the orienting bias caused by spatial neglect, Neuropsychologia., 2009, 47, 3, 634-638
[10] Karnath H.O., Suchan J., Johannsen L., Pusher syndrome after ACA territory infarction, Eur. J. Neurol., 2008, 15, 8, e84-e85
[11] Karnath H.O., Johannsen L., Broetz D., et al., Prognosis of contraversive pushing, J. Neurol., 2002, 249, 9, 1250-1253
[12] Babyar S.R., Peterson M.G., Bohannon R., Clinical examination tools for lateropulsion or pusher syndrome following stroke: a systematic review of the literature, Clin. Rehabil., 2009, 23, 7, 639-650
[13] Baccini M., Paci M., Rinaldi L.A., The scale for contraversive pushing: A reliability and validity study, Neurorehabil. Neural. Repair., 2006, 20, 4, 468-472
[14] Lafosse C., Kerckhofs E., Troch M. et al., Contraversive pushing and inattention of the contralesional hemispace, J. Clin. Exp. Neuropsychol., 2005, 27, 4, 460-484