

Activation of breathing during upper cross syndrome

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Abstract

Background: Activating the diaphragm is a key step not only for breathing but also for physiological stabilisation of the torso. The abdominal muscles provide essential support for the diaphragm. Therefore, it is important for abdominal wall to be expanded not only to the front, but in all directions (sideways and to the back). Cranial movement of the navel is unwanted, as its movement points to an undesirable muscle pull in the cranial direction.

Method: 50 patients were enrolled, based on the same diagnosis. The age range was 24-52 years. The patients were split into two groups, each with 25 patients, first group received kinesiotherapy, while the second group received kinetic treatments as well as physical therapy. Results were statistically evaluated.

Conclusion: At the beginning, 45 patients from displayed incorrect stereotype of breathing. A positive diaphragm test was recorded with 36 patients and correct

diaphragm activation was recorded with 14 patients. After kinesiotherapy, correct stereotype of breathing was recorded with 33 patients, and 17 patients kept the breathing with incorrect stereotype. The diaphragm test was positive with 14 patients and negative with 36 patients. Stereotype of breathing improved in 28 patients and diaphragm activation displayed via the diaphragm test improved in 22 patients.

Key words: Diaphragm. Stereotype of breathing. Diaphragm test.

Introduction

The diaphragm as the main respiratory muscle is involved in active contraction while breathing. It has an important postural function in stabilizing the middle and lower thoracic spine. When internal incoordination is present, rotation of the torso is limited and the stereotype of breathing is changed to upper type with an increase in breathing resistance and increase in work of breathing. The correct

way of breathing is one of the preconditions for physiological stabilization of the spine. But it is also the opposite - posture affects breathing very much. Therefore it is necessary to ensure the involvement of the diaphragm in breathing and thus to stabilize function without auxiliary respiratory muscles. A prerequisite for this function is straightening of the spine and chest adjustment to the caudal position. We pointed at importance of consider their individual needs, mental and physical state (Mačkinová, M. 2008).

The methodology of work and research methods

The survey was conducted at Physiotherapy and Rehabilitation Department in Bratislava. 50 patients with a diagnosis of upper crossed syndrome attended. Patients in the age of 24-52 years were divided in two groups. Kinesiotherapy was implemented to the first group and for the second group electrotherapy was added. Patients were followed five months.

Objective and Results

The aim was to determine, whether there is a correlation between the activation of the diaphragm before therapy and influencing stereotype breathing after treatment. We set the hypothesis assuming that the correct

activation of the diaphragm itself has no significant impact on removal of incorrect stereotype of breathing.

We investigated the correct breathing stereotype and quality of connection of diaphragm in breathing by phrenic test in whole group.

In the first group of patients incorrect breathing stereotype was in 22 (88%) patients, and a positive phrenic test was in 19 (76%) patients. After completion of physiotherapy 15 (60%) patients modified their stereotype of breathing, and 7 (28%) patients did not improve. The quality of connection of the diaphragm was improved in 11 (44%) patients (Table 1).

Table 1 diaphragmatic test and breathing stereotype in group 1 patients

	Entrance examination		Control examination	
	Positive test (incorrect)	Negative test (correct)	Positive test (incorrect)	Negative test (correct)
Diaphragmatic test	19	6	8	17
Breathing	22	3	7	18

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Patients in the second group were examined with incorrect stereotype of breathing in 23 (92%) patients, and with positive diaphragmatic test in 17 (68%) patients. After completing physiotherapy correct breathing stereotype was in 15 (60%) patients and 10 (40%) patients remained with breathing stereotype wrong. The quality of connection of diaphragm was improved in 11 (44%) patients (Table 2).

Table 2 diaphragmatic test and breathing stereotype in group 2 patients

	Entrance examination		Control examination	
	Positive test (incorrect)	Negative test (correct)	Positive test (incorrect)	Negative test (correct)
Diaphragmatic test	17	8	6	19
Breathing stereotype	23	2	10	15

In the whole group of patients, an incorrect stereotype of breathing was examined in 45 (90%) patients and only 5 (10%) had the correct stereotype. A positive diaphragmatic test in the initial stage was in 36 (72%) patients. After completing of physiotherapy correct breathing stereotype was in 33 (66%) patients and 17 (34%) patients remained with breathing stereotype wrong. Diaphragmatic test was positive at the beginning of physiotherapy in 36 (72%) patients, and was positive in 14 (28%) patients (Table 3) after physiotherapy.

	Entrance examination		Control examination	
	Positive test (incorrect)	Negative test (correct)	Positive test (incorrect)	Negative test (correct)
Diaphragmatic test	36	14	14	36
Breathing stereotype	45	5	17	33

To evaluate the independence of the qualitative data we used Chi - square test of goodness of fit. Test was carried out at the significance level $\alpha = 0.05$. Using the chi - square test we verified whether the activation of the diaphragm before therapy and proper breathing stereotype after therapy has any significant dependence in the whole group of patients.

The null hypothesis (H0) - correct stereotype breathing after treatment is independent of the activation of the diaphragm before therapy.

An alternative hypothesis (H1) - correct breathing stereotype after therapy is influenced by activation of the diaphragm before therapy.

The results are presented in the Association Table (Table 4).

Table 4 Distribution of frequency for activation of the diaphragm before therapy and stereotype of breathing after therapy

		Stereotyp dýchania po terapii		
		Correct	Incorrect	Total
Diaphragmatic test before	Correct	10	4	14

therapy		20,0 0%	8,00 %	28,00 %
	Incorrect	23	13	36
		46,0 0%	26,00 %	72,00 %
	Total	33 66,0 0%	17 34,00 %	50 100,0 0%
	P-value	0,6133		
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Statistical tests show that we were unable to prove the dependence of breathing stereotype and the activation of the diaphragm during breathing. This fact may be due to the small number of patients in the survey. Therefore, the null hypothesis H0 is valid, where we assumed that correct breathing stereotype after treatment is independent of the activation of the diaphragm before therapy. This is confirmed by Pearson coefficient, which is low - 0.0715.

Discussion and conclusion

In objective investigation, we focused mainly on the examination of shortened and weakened muscles in the neck and on the occurrence of upper crossed syndrome, the presence of which we confirmed by examination of the stereotype of the

position and rotation of the head. We investigated the movement patterns of breathing and proper activation of the diaphragm by diaphragmatic test. At the beginning of physiotherapy, we focused on the elimination of muscle imbalances and on practicing proper breathing. We have added the pilot positions of Pilates Medical as pretreatment for correct setting body for individual exercises, exercises with rubber expander from SM system by Smisek in the correct settings of the machine, exercising with terraband, Brugger seats. For physical therapy we applied continuous TENS waves and polarized light from the BIOPTRON to the same place.

The correct way of breathing is another precondition for physiological stabilization of the spine. However, this is also the opposite: posture affects breathing in very sensitive way, which is called postural respiratory function of the diaphragm. Our aim was to ensure the involvement of the diaphragm in breathing and thus to stabilizing function without the participation of accessory respiratory muscles. A prerequisite for this function is straightening of the spine and chest by adjustment to the caudal position. While breathing in the ribs move laterally (wing movement), lower thoracic outlet extends,

sternum moves ventrally and breathing is not answering. The abdominal muscles are the backbone of the diaphragm. It is important that the abdominal wall is not extended only forward, but in all directions (to the sides and back). Activation of the diaphragm has an important role not only for breathing but for physiological stabilization of the body (Kolar et al., 2009). Internal incoordination of diaphragm is characteristic with limited rotation of the whole torso, changed stereotype of breathing to the upper respiratory type and also with increased breathing resistance and increased in work of breathing (Skalka, 2002). Both authors affirm our belief in the hypothesis that in the majority of patients, the proper activation of the diaphragm leads to the elimination of incorrect stereotype of breathing. Statistically, this could not be confirmed.

References:

- KOLÁŘ, P. a kol. 2009. *Rehabilitace v klinické praxi*. Praha : Galen, 2009. 713 s. ISBN 978-80-7262-657-1.
- MAČKINOVÁ, M. 2008. Intelligence of emotions. In: *Ošetrovateľský obzor*. - ISSN 1336-5606. - Roč.5, č.3 (2008), s. 115.
- SKALKA, P. 2002. *Možnosti léčebné rehabilitace v léčbě močové inkontinence*.

In *Urologie pro praxi* [online]. 2002, roč. 2, č. 3, [cit. 2014-01-20]. Dostupné na internete:

<<http://www.urologiepropraxi.cz/pdfs/uro/2002/03/02.pdf>>. ISSN 1803-5299.

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