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Network of breathing. Multifunctional role of the diaphragm: a review

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Dear Editor,

I read with interest the item by Kocjan and colleagues [1]. I appreciated the article and the use of the information from my previous article [2]. Diaphragm is essential for the act of breathing and for other somatic functions described in the text: postural function; cardiac function; lymphatic function; emesis; anti-reflux barrier and swallowing [1]. I would like to make two clarifications; the first concerning a citation of the article, and the second to add the information about diaphragmatic functions.

In the section “Cardiac Function” (page 229, seventh line), Authors write: “Stone suggested that diaphragm movement may influence the movement of the heart as the pericardial sac is connected to the diaphragm by phrenicopericardial ligament, and a lack of diaphragm movement may reduce heart contractility and blood circulation throughout the body”. The cited reference is the number 3, that is, my article.

I would like to add a lasting reflection on the respiratory functions. The diaphragm has other properties related to the emotional sphere and the threshold of pain. The pain perception is reduced in inspiratory apnea, when the diaphragm is lowered [3]. A theory that would explain this phenomenon is the intervention of baroreceptors, which are found in the aortic arch and in the glomus caroticum. The pressure generated by inhalation could affect the blood redistribution, which could be probably correlated with the response of baroreceptors and the reduction of pain perception [4]. The same perception of pain, particularly of the chronic type, can alter the function of the diaphragm, in a biunivocal relationship [3].

The diaphragm muscle affects the balance of the emotional sphere. This relationship is based on exchanges of information between the brain stem and the brain centers such as the limbic area and cortex [5]. The amygdala (limbic system) is connected through afferent and efferent ways to each of

the respiratory areas; the person's experience and its history influence the behavior of the diaphragm [5].

To conclude, the diaphragm should be considered not only for any somatic symptoms, but also for emotional alterations and chronic pain situations. For example, we find symptoms like chronic pain, anxiety and depression in chronic conditions such as COPD (chronic obstructive pulmonary disease) and CHF (chronic heart failure) [3]. Equally, we find chronic diaphragm dysfunction in these diseases. Probably, a multidisciplinary team could be the key to success for a better therapeutic approach.

Conflict of interest

The author declares no conflict of interest.

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