

# **Abstract:**

## **Title :**

Diaphragm in the role of oesophageal sphincter and the possibility of treating reflux oesophageal disease by physiotherapeutic procedures

## **Background:**

The diaphragm, its bloody part, is considered by many authors to be part of the antireflux barrier. However, many are not aware of its reactivity in this area, its maximum strength, and how posture is manifested in the activity of this part of the diaphragm. This work is devoted to the diaphragm topic in the role of the lower esophageal sphincter and we want to point out the potential impact of the diaphragm on the competence of this esophageal sphincter in patients with reflux oesophageal disease and to reveal the possibilities how physiotherapy can help in the treatment of this part of skeletal muscle so as to improve the function of the lower oesophageal sphincter (LES). We also want to point out the postural function of the diaphragm by means of an intrauterine measurement, thus verifying its stabilization function for the axial system and verifying some maneuvers and techniques commonly used in the physiotherapist's clinical practice, but not objectively. The thickness of the diaphragm itself is then partially measurable by means of special spirometry, so-called occlusion pressures.

## **Method :**

The group of probands included a total of 62 patients aged 20 - 77 years, of whom 39 were women and 48 men. BMI 26.2. All patients had clinically proven gastroesophageal reflux disease (GERD). The examinations were at the 3rd Surgical Clinic of the University Hospital Motol (Esophageal Rehabilitation Center) and at the Internal Clinic of the Faculty Hospital Motol. Patients were subjected to a functional oesophageal examination using MMS's High Resolution Oesophageal Manometry using a 36-channel single use probe and a special spirometry focused on the strength of the respiratory muscles, so-called occlusal pressures. The maximum inspiratory pressure (P<sub>Imax</sub>) and maximum expiratory pressure (P<sub>E<sub>max</sub></sub>) were measured using a spirometer - MasterScope version 5.5 from Jaeger. For probands, the respiration force of the inspirational and expiratory muscles was examined and the ratio between them, changes in the diaphragmatic or abdominal breathing activity of the diaphragmatic or abdominal breathing, the activity of the diaphragmatic or abdominal breathing of the diaphragmatic part of the diaphragm at the trigeminal of the lower limbs above the pad, the manual stabilization of the chest and ThL transition, spine. The results were statistically processed with significance level  $p = 0.05$  and processed into graphs and tables.

## **Results:**

The mean resting pressure in the region of the lower esophageal sphincter was 14mm / Hg. During all maneuvers, it increased statistically by  $p = 0, 05$  and less. The LES pressure is statistically significant in cranial spine traction compared to the spontaneous spontaneous position of the head and cervical spine of the probands (P-Value = 0.000276574). The LES pressure changes statistically significantly over chest cavitation and stabilization compared to resting pressure (P-Value = 2,37727E-10). The LES pressure changes statistically significantly over abdominal pressure (P-Value = 0.00000852412) for abdominal breathing. The LES pressure changes statistically significantly (P-Value = 1,96313E-8) when the lower limbs are raised (triflex) above the washer relative to resting pressure. Patients with GERD have significantly lower P<sub>Imax</sub> compared to standards (P-Value = 7.61528E-11). Patients with GERD have a significantly lower P<sub>E<sub>max</sub></sub> than the norm (P-Value = 0.0000055177).

Patients with GERD have a significantly lower P<sub>I</sub>max than P<sub>E</sub>max (P-Value = 2.32608E-9).

**Summary and conclusion:**

From the above results, patients with GERD have decreased inspiration and expiratory function. Furthermore, the cervical part of the diaphragm responds by increasing its activity and strength in the lower esophageal sphincter area in all investigated maneuvers and in all cases strongly statistically significant. The diaphragm is therefore a real component of the antireflux barrier. In addition, its activity and strength can be influenced by a change in postural conditions, a change in load, but also a respiratory motor (breathing pattern) and even a change in the activity of the cervical spine and the auxiliary insulin muscles in the cervix. The results are indicative of the postural function of the diaphragm, the influence of postural and respiratory mechanics on the lower esophagus area and the possibility of functional training of the LES area. We have also been able to objectivize the effectiveness and impact of maneuvers from the physiotherapist's clinical practice. Physiotherapy therefore appears to be a suitable alternative to GERD therapy.

**Key words :**

Gastroesophageal reflux disease, diaphragm, manometry, low oesophageal sphincter, physiotherapy