Use of the DETENSOR-method in the treatment of chronically obstructive respiratory diseases

I.V. Netschaj, O.V. Balakirewa, K.L. Kienlein

A steady rise in chronically obstructive diseases has been noticed in recent years. The not always effective medication, the early invalidity of patients and complications derived from medicative treatment promote the development of non-medicative assistive treatment methods directed towards the reestablishment of functional possibilities in the organism (4).

The functionally afflicted respiratory musculature and especially the diaphragm (2, 5, 10) play an important role at the beginning of development to complications in the chronically obstructive diseases, as in obstructive emphysema and respiratory insufficiency. Aside from restricting the air flow on expiration, which leads to an increase in residual lung volume during development of emphysema, an important role is played by the increased tonicity of the inspiratory muscles during inspiration (1, 2, 4). The conditions of an established, stable emphysema creates unfavorable conditions for the inspiratory muscles. It results in increased diaphragmatic consistency with consequent reduction in curvature and thus shortening of fibers in the adjacent musculature. All of these lead to asynchronicity and inefficiency in the respiratory musculature (4, 6). The increase in respiratory effort of the patient subjected to bronchial restrictions in the respiratory passages and emphysema develops a fatigue syndrome in the respiratory musculature (3, 4, 6). It can be seen that the subjective perception of the impaired respiration depends on the clinically evaluated degrees of fatigue in the respiratory muscles, the differing degrees of dyspnea, pain in the thoracic and abdominal musculature following attacks of suffocation and observable asynchronous respiratory movements in the thoracic and abdominal wall (6, 8, 10).

The objective of our investigation was to determine the efficiency of the Detensor-therapy on patients suffering from chronic obstructive respiratory diseases and functional impairment of the respiratory musculature according to their clinical symptoms. The Detensor-method developed by Dr. K.L. Kienlein (Germany) is based on physiological relief and support of the spine, whereby the patient is placed in the supine position. The Detensor-therapy meets the major requirement of ideal systems for the regeneration of the spine. The long term distention of the spine is performed under relaxing conditions and in optimal direction in a functionally correct support of the spine, simultaneously maintaining the physiological curvatures. This is achieved by an elastic design comprising inclined ribs that change their direction under the body weight of the patient. Placing the patient on this system produces an optimally directed force of distention directly related to the body weight, leading to a relief in the kinematic systems of the spine, excluding excessive distention and traumatization. This being in contrast to the currently applied extension devices (traction slings, cages, etc.).

The system consists of a mattress and a therapy mat. The mattress produces a distention of 5-10% of the body weight and the therapy mat used in the course of the day averages 18-25% distention.

A considerable feature of this system is found in the emotional comfort experienced by the patient during treatment (due to the absence of complicated devices, straps and weights, which could evoke an additional stress effect). A further increase in treatment
duration with uniform distention is possible. Turing motions during distention (7, 9) are possible and indicated.

This work was performed at the Center of „MEDARTpolycura“ and the pulmonologic department of the Polyclinic No. 22 in Moscow.

**The following tasks were set to achieve the objectives of this investigation:**

1. Investigation of the efficiency of Detensor-therapy on chronically obstructive respiratory diseases and functional impairment of the respiratory musculature according to clinical symptoms.
2. Investigation of the characteristic influence of this method on the functional condition of the respiratory musculature.

Thus, 42 patients suffering from chronically obstructive bronchitis, i.e. infectious bronchial asthma, over long periods of time were observed. The clinical characteristic of this group is stated in Table 1.

The patients were divided into 2 groups. A main group of 28 patients, who were subjected to treatment on the Detensor and a control group, consisting of 14 patients. The patients of both groups exhibited clinical fatigue symptoms of the respiratory musculature during the state of instable remission with a daily need of 4-5 inhalations.

**The test conditions:**

2. Treatment duration 40 minutes daily during 15 days. Patients of the main group underwent therapy on the Detensor-mat. Patients of the control group were placed on an ordinary Parolon-mat.
3. Patients were instructed to completely relax themselves and that an examination of their respiratory functions will made following the treatment to investigate the regenerative capacity of the respiratory musculature following their supine relaxation, i.e. psychologically the patients were not informed about the relaxation effect of the Detensor-mat.
4. The above treatment was performed before basic therapy.

The effectiveness of the treatment was evaluated on clinical data, self control questionnaires and on the respiratory function before and after the treatment sequence. 82% of the patients in the main group with chronically obstructive bronchitis and 75% of the patients with infectious bronchial asthma exhibited improvement as measured under all criteria. The control group showed improvement in their subjective condition. In the analysis of the subjective condition, it was most important for all patients to perceive a reduction in their effort to breathe.

The patients expressed their complaints in the self control questionnaires and their daily sympathomimetic needs. Pain reduction in the chest and abdominal musculature occurred in all patients of the main group. Their condition improved, asphyxiation during the day ceased and the number of inhalations declined. The effect remained for one week following cessation of the treatment and subsequently declined in the direction of their original condition. The control group did not exhibit any significant positive effect.
The changes in the fatigue syndromes of the respiratory musculature were measured physically. They are presented in Table 2.

The mechanics of respiration was measured by the Flowscreen-device (Erich Jaeger, Germany). The functional parameters of the respiratory musculature, representing force and endurance, were analyzed:

- **MVV** - Maximum ventilatory volume
- **VC** - Vital capacity
- **PEF** - Maximum expiratory flow
- **PIF** - Maximum inspiratory flow
- **FIF1** - Volume of forced expiration/second
- **Rocc** - Bronchial resistance
- **TLC** - Total lung volume
- **RV** - Residual volume
- **ERV** - Expiratory reserve volume
- **IC** - Inspiratory capacity

The respiratory function was presented by a "volume flow curve". The tips in the volume flow curve of the expiratory- and inspiratory flow remained constant during forced in- and expiration. The standard 12 second procedure was used to determine the MVV. The results were expressed in percent of the reference values. Determination of the statistical values followed the parametric free Wilcoxon-Criteria and the methods of variation statistics according to the T-student criterion. The dynamics of the respiratory function are presented in Table 3.

The table reveals, that patients in the main and control group were found in their terminal state of functionally unfavorable conditions which were related to a high degree of obstruction and excessive air volume. The incead muscular work under those conditions lead to an extensive loss of force and endurance as well as to the development of a decompensated respiratory muscle insufficiency (4, 10). The parameters governed by the force during tests (VC, PIF, PEF, FIF1 and MVV) rise in 10 test sessions of the main group, remaining unchanged in the control group. The level of MVV also rises in the main group. In total, these results prove a rise in force and endurance of the respiratory musculature. The simultaneous rise in the parameters of the respiratory functions depending upon the force and endurance of the respiratory musculature, i.e. reduction of work intensity required to maintain adequate ventilation, prove the increase in so-called force reserves (difference between constantly required and maximum available) (3, 6). These changes in the functional parameters of the respiratory musculature depend mostly upon the changed terminal conditions and consequently on the filling volume of the lung, on the functional residual capacity of the lung, the residual volume influenced by the resistance in the respiratory passages and the stretch capacity of lung tissue. These return to their original values upon cessation of treatment (within one week).

These results permit the Detensor-method to be used in the individual daily and also inpatient treatment for those afflicted with chronically obstructive bronchitis i.e. infections bronchial asthma with steroid dependency. Further, this procedure can be applied with other non-medicative treatment methods. Presently, we conduct
investigations using the Detensor-method in combination with the Halo-therapy and controlled micro-climate in salt mines.

**Results:**

The application of this method is not complicated and does not require lengthy instructions.

The method produces a regenerative influence on the functional condition of the respiratory musculature afflicted by chronically obstructive diseases of the respiratory passages.

Inclusion of this method in the complex rehabilitation of patients with chronic lung obstructions improves respiratory function reflecting the activity of respiratory muscles (force and duration).

**References:**

2. Alexandrova, E.V. Golubeva, VI. Minjaev. The combined action of the outer interim muscles of the ribs with the diaphragm during development of fatigue impairment in the respiratory musculature. Current questions in Medicine, Moscow, 1993, pp. 114-122.
### Table 1  Clinical Data on Patient Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Nosology</th>
<th>Number of Observ.</th>
<th>Sex</th>
<th>Age</th>
<th>Duration of Disease</th>
<th>Steroid Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Main group n=28</td>
<td>chron.obstr. bronchitis infect.dep br.asthma</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>Ø 54 (45-63)</td>
<td>9 yrs. (5-15 yrs.)</td>
</tr>
<tr>
<td>II Control group n=14</td>
<td>chron.obstr. bronchitis infect.dep. br.asthma</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>Ø 54 (45-63)</td>
<td>9 yrs. (5-15 yrs.)</td>
</tr>
</tbody>
</table>

### Table 2  Methods of physical examination of fatigue syndromes in respiratory musculature

<table>
<thead>
<tr>
<th>Method</th>
<th>Main Group n=28</th>
<th>Control Group n=14</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Control of rel. Displacement of chest and abdomen (One hand on chest, the other on abdomen)</td>
<td>Asynchrome respiration eliminated</td>
<td>Asynchrome respiration unchanged</td>
</tr>
<tr>
<td>II Abdominal palpation to determine intra-bronchial pressure on inspiration</td>
<td>Intra-bronchial pressure rises, isolated shortened abdominal muscles</td>
<td>Intra-bronchial pressure rises isolated shortened abdominal muscles unchanged</td>
</tr>
</tbody>
</table>

### Table 3  Changes in Respiratory Functions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Main group n = 28</th>
<th>Control group n = 14</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial</td>
<td>After 1st Treatment</td>
</tr>
<tr>
<td>MVV</td>
<td>56,4 + 5,4*</td>
<td>63,0 + 6,9</td>
</tr>
<tr>
<td>VC</td>
<td>74,1 + 7,5*</td>
<td>88,1 + 9,6</td>
</tr>
<tr>
<td>IC</td>
<td>99,1 + 9,8</td>
<td>90,1 + 9,2</td>
</tr>
<tr>
<td>ERV</td>
<td>56,1 + 9,5</td>
<td>59,2 + 5,2*</td>
</tr>
<tr>
<td>FVC</td>
<td>67,7 + 8,9</td>
<td>77,7 + 8,3*</td>
</tr>
<tr>
<td>FEV 1</td>
<td>42,6 + 4,1*</td>
<td>48,8 + 4,6*</td>
</tr>
<tr>
<td>PEF</td>
<td>25,2 + 2,4*</td>
<td>35,4 + 3,2*</td>
</tr>
<tr>
<td>MEF 50</td>
<td>27,3 + 3,1</td>
<td>27,12 + 2,1*</td>
</tr>
<tr>
<td>MEF 25</td>
<td>26,7 + 2,7*</td>
<td>28,5 + 2,8*</td>
</tr>
<tr>
<td>MMEF 25/75</td>
<td>24,3 + 2,2*</td>
<td>26,5 + 3,4</td>
</tr>
<tr>
<td>FIV 1</td>
<td>42,5 + 5,3*</td>
<td>56,4 + 5,2*</td>
</tr>
<tr>
<td>Rocc</td>
<td>110,0 + 12,1</td>
<td>84,0 + 8,2*</td>
</tr>
</tbody>
</table>

* p<0.05