The new respiratory technology with method of Detensor-Therapy in childhood bronchial asthma

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Children frequently have changes in the cervical spine as revealed by X-ray. As a rule, those disturbances are occasional findings and they are the consequence of natal trauma (1, 10). The cervical part of the spine experiences significant load during normal and complicate birth. This load offers opportunity for damage of the intervertebral disks. This then leads to the development of chronic dislocation of vertebrae. The consequence is trauma of vertebral artery leading to transient ischemia of the brain and the formation of vegetative disturbances (hypothalamic disturbances connected with autonomic nervous system). Clinical observations and experimental data showed that natal labor’s trauma of cervical spine with dislocation of vertebrae cause autonomic dysfunction with secondary changes in microcirculation and innervation of the esophagus, stomach, intestines, and respiratory tract (1, 3). It manifests clinically in the form of motor and evacuating disturbances of the gastrointestinal system, (gastroesophageal reflux, spasm or hypotonic dyskinesia of small intestine), and dyskinesia of the bronchial tree (chronic bronchitis). The therapeutic device for long-term vertebral traction, the “Detensor” is used successfully for the treatment of adults who have inborn trauma, inflammatory or metabolic vertebral pathology (6, 8, 9).

There are a few reports and publications about this method in pediatrics (4, 7, 9). We observed 103 children aged 4 to 15. The children were hospitalized with the following pathology: inborn disorders with growth disturbances (12 patients), functional disorders of the gastrointestinal system and chronic gastritis (59 patients), bronchial asthma, chronic bronchitis and dermatо-respiratory syndrome (32 patients).

Method of administration of “Detensor”-Therapy

The therapeutic system “Detensor”, developed by Professor K. L. Kienlein (Germany), is used with success in therapeutic, neurologic and orthopaedic clinics. Traction of the spinal column is done under relaxing conditions, in optimal direction, coordinating correct functional position of spine and preserving physiologic vertebral curves. It is supported by special elastic construction. Placing the patient on the “Detensor” system does form traction forces which strictly depend upon the patient’s weight. In general, this leads to the release of the load from the spine’s kinematic system and excludes overstretching with possibility of trauma. This is in contrast to all other traction systems. The traction strength is 5-10 % of the body weight on the night sleep mattress and 18-25 % of the body weight on the therapeutic pad for during the day procedures. All children were put on special child “Detensor” for a period of 30-40 min. Treatment was administered every day, for 10 procedures. The important advantage of this treatment is emotional comfort for the child and the opportunity for intensive short-term traction. Children did like the procedure. The effectiveness of treatment was evaluated to clinical data, electrophysiological data (cardiointervalography = measurement of the intervals of cardiac cycles), electroencephalography (EEG) and computerized spirography.
Results of examinations and treatment

Changes in the cervical spine due to birth complications or inborn pathology (vertebral dislocations, prominent distortion of the vertebral axis, osteoporosis and flattening of the vertebral bodies, changes in the intervertebral disks, and Kimmerli’s syndrome) were found by X-ray investigation in all children. Neurological examination revealed minimal changes: some asymmetry of the facial muscles, relatively high shoulder with relative shortening of the neck, some body asymmetry due to the different levels of the right and the left shoulders. Palpation of the neck, shoulders, vertebral and paravertebral areas revealed areas with increased sensitivity and pain in almost all children. Initial EEG showed moderate changes of bioelectrical activity of the brain. Those changes had residual and organic genesis. They were presented as periodic disorganization of the form, frequency and amplitude of the cortex rhythm. There were moderate irritation of subcortex structures at the level of mesodiencephalon. Hyperventilation showed areas of dominating teta-waves, “acute” potential in different areas of brain (occipital, temporal, et.) and tendency to the formation of paroxysmal activity at the brain item. Localized changes were not found in any patient. The Pneumoscreen “Erich Jaeger” was used for the lung function testing. The following parameters of ventilation were studied: VC – vital lung capacity, FVC – forced vital lung capacity, FEV1 – volume of force expiration after 1 sec., FEV1/VC – test Tiffno, PEF – peak/maximal/expiratory flow, MEF 75 % - maximal expiratory flow at the 75 % of VC max., MEF 50 % - maximal expiratory flow at the 50 % of VC max., MEF 25 % - maximal expiratory flow at the 25 % of VC max.

All children were examined by spirography before treatment. Investigations were included pharmacological tests with bronchiolitic drugs (5-10 min. after use of “salbutamol”). All children were tested with a spiroanalyser after “Detensor”-therapy as well. No children were treated with other drugs in addition with “Detensor”-therapy. It is difficult to evaluate the effectiveness of “Detensor”-therapy with these subjects. Initial studies of breathing function showed that all patients had moderate disturbances of ventilation in the entire bronchial tree. Fifteen patients had negative reaction to bronchiolitics. All patients had positive changes in lung function testing after “Detensor”-therapy. These changes ranged from weak to significant. All ventilatory parameters showed a 15 % increase after the procedure. Studies with bronchiolitics showed an increase of 17, 5 %. Though the most sensitive and reproducible parameters were FEV1 (p<0,05) and MEF75-25 % (p<0,01) they have not reached normal ranges (Tabl. 1).
The parameters of the lung function testing during “Detensor”-therapy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Before treatment</th>
<th>After treatment</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1/VC</td>
<td>94.8 ± 11.2</td>
<td>97.1 ± 13.2</td>
<td>nonsignificant</td>
</tr>
<tr>
<td>PEF</td>
<td>85.6 ± 7.3</td>
<td>95.1 ± 6.9</td>
<td>nonsignificant</td>
</tr>
<tr>
<td>MEF25</td>
<td>72.9 ± 51.1</td>
<td>90.3 ± 5.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>MEF50</td>
<td>84.2 ± 6.4</td>
<td>106.1 ± 6.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>MEF75</td>
<td>74.3 ± 5.8</td>
<td>91.1 ± 6.6</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>VC</td>
<td>92.2 ± 10.3</td>
<td>91.9 ± 9.9</td>
<td>nonsignificant</td>
</tr>
<tr>
<td>FVC</td>
<td>79.7 ± 11.5</td>
<td>78.2 ± 12.7</td>
<td>nonsignificant</td>
</tr>
<tr>
<td>FEV1</td>
<td>70.4 ± 6.4</td>
<td>88.2 ± 13.1</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Most of children had improvement of ventilation at the level of large and medium bronchi. One third of children had improvement at the level of small bronchi only. All children showed positive reaction to bronchiolitics. Thus, improvement of breathing mechanics after the administration of “Detensor”-therapy testifies for the increase of breathing compensatory capabilities, i.e. increased force and stamina of breathing muscles. Use of “Detensor”-therapy helps to decrease the risk of muscle failure within the respiratory organs and to support better lung ventilation through the improvement of the functioning conditions. Clinical examination of children with bronchopulmonary pathology during “Detensor”-therapy showed decrease of cough and better auscultation of the lung sounds. Children had no asthma attacks during treatment. Children with dermato-respiratory syndrome showed decrease of itching, improve of general state and better sleep. Patients with functional disorders of gastrointestinal tract showed decrease or even disappearance of motoric and evacuatory disturbance after “Detensor”-therapy. Obviously, it was because of the change of status of general and autonomic nervous systems. These patients reported disappearance of stomach pains and easier stool evacuation after 3-5 procedures.

The group of 10 patients with inborn disorders with a defect of the musculoskeletal system and small height consisted of: six children with noncomplete osteogenesis, two children with achondroplasia (defect of the cartilage development), two children with spondiloepimetaphysic dysplasia. These children were 7-15 years old. Children were not higher than 127 cm, and not heavier than 35 kg. All these children had prominent changes of the vertebras as a consequence of these main disorders, kyphosis, kyphoscoliosis, plastyspondylia (flattening of the vertebral body), and symptoms of basilar impression (insufficiency).

An increase of height from 1 to 3.5 cm has been noticed in five children 4 weeks after the end of the course of “Detensor”-therapy. All patients showed improvement of posture and decrease of vertebral pains. The one child diagnosed with achondroplasia and deafness in first grade, reported the restoration of hearing after the treatment course. “Detensor”-therapy improved blood circulation in the vertebra-basilar system and rehydration of intervertebral disks in these patients. Most of the children tolerated treatment very well. Though some unwanted effects were noticed. Six patients complained of short-term vertigo after the procedure, three patients with basilar impression symptoms complained of nausea, and one patient experienced pain in the upper shoulder and neck area during the procedure. It should be mentioned that these side effects seldom occurred, didn’t change the overall
favourable impression about the method. EEG showed disappearance of disorganized cortex rhythmics along with positive clinical changes.

Discussion

It has been shown in recent years that children frequently are poorly diagnosed with vertebral changes. These changes contribute to the development of functional disturbances of different organs and systems and/or aggravate the existing disorders. Manual therapy (spinal manipulative therapy) is offered in such cases as a pathogenetical treatment. Some specialists noticed that cervical manipulations in children are dangerous because of unwanted side effects. Analysis of 1824 cases showed that manual therapy is contraindicated in 4.1% of cases (5). Traction method of “Detensor”-therapy is the best approach for correction vertebral pathology in children, especially in disorders of the cervical region.

Our investigations showed that 63% children with bronchial asthma had disorders of the cervical vertebrae and intervertebral disks as the results of the pathologic (rapid or prolonged) labor. New original device of "Detensor"-therapy is a system of flexible synthetical plates assembled in the form of a mattress (the force of traction is 5%-25% of patient’s weight) for long-term traction of spinal column and its correction. The computerized spirometry was used for the lung function testing. After application of “Detensor”-therapy the positive changes in some of the parameters of lung function testing were observed. After treatment MEF-25 increased from 72.9 ± 5.5% to 90.3 ± 5.8% (p<0.01), MEF50 – from 84.2±6.4% to 106.1±6.8% (p<0.01), MEF75 – from 74.3±5.8% to 91.1±6.6% (p<0.01), FEV1 – from 70.4±6.4% to 88.2±13.1% (p<0.05). Children had no asthma attacks during treatment. The effect of “Detensor”-therapy is the decrease, relief of the disorders in spinal column and normalising of autonomic nervous regulation of respiratory system and the chest muscles.

Thus, “Detensor”-therapy is a worthy part of a complex therapy for children with vertebral pathology to correct pulmonary disturbances.

Conclusions

Vertebral disturbances contribute to the development of functional diseases of the internal organs through the autonomic nervous system and increase the existing disorders. The using of “Detensor”-therapy normalises the status of the spinal column and the autonomic nervous regulation of respiratory system with the improvements of the parameters of the lung function testing and clinical findings. “Detensor”-therapy is recommended as part of a complex treatment for children with vertebral pathology for correction of the disturbances of the spinal column.
References

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6.
After traction of the spine column with Detensor therapy were observed following:

- decrease of the thoracal hyperkyphosis
- normalization of the length of the thoracal kyphosis
- decrease of the abdominal and intrapleural pressure
- synchronization of the thoracic and abdominal respiration
The possible therapeutic influence of the Detensor therapy in children with bronchial asthma

**increase of the level of the sympatomimetics**

**relief of decrease of the spasm of the unstriated bronchial muscles**

*stimulation of the adrenal suprarenal glands*

*increase of the level of the glucocorticoids*

*decrease of the allergic inflammation into bronchial tubes*

- increase of the respiratory capacity and normalization of the lung ventilation
The parameters of the lung function testing after Detensor therapy

* increase of the MEF 75 % (maximal expiratory flow at the 75 % of the volume lung capacity).
* increase of the MEF 50 %
* increase of the MEF 25 %
* increase of the volume of force expiration after 1-second (FEV1)
* increase (nonsignificant) of the peak expiratory flow
Normalization of the condition of the spine column after Detensor therapy

before Detensor therapy

after Detensor therapy
Therapeutic Pad (5 % traction) without cover

Traction force measuring device
Therapeutic pad for possible 24h a day passive 5 % traction treatment

Therapeutic mat for 40 min intensive (active) 18 % traction treatment