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# QUALITY OF LIFE OF PATIENTS WITH PECTUS EXCAVATUM

**ABSTRACT**

The purpose of the work was to evaluate life quality in children after pectus excavatum operation in the remote periods.

The main operational methods included surgery by the Nuss and Ravich method. According to the results of the research conducted on the basis of the SF36 questionnaire we proved the high effectiveness of surgical treatment in children with pectus excavatum II-III stages. And also we proved the significant importance of the selected method of surgical treatment.

**Keywords:** quality of life, pectus excavatum, physical functioning, social functioning.

## INTRODUCTION

Recently, there are few works devoted to the evaluation of the psycho-social importance of correctional operations in orthopedic pathology, including the deformation of the chest.

Pectus excavatum - deformation of the chest (PE) - according to the literature, it accounts for 91% of all congenital deformations of the chest, the frequency of occurrence of PE varies from 0.06 to 2.3% in population. Pathogenesis is still unknown, but according to modern theories, primarily this disease is a manifestation of the connective tissue dysplasia syndrome and is caused by disorders in the synthesis at the genetic level [5, 6]. It is assumed that the cause of formation of PE is the dyschondrogenesis of hyaline costal cartilage, leading to advancing growth of the ribs and, as a consequence, sternal insertion into the chest [7].

The progress of medical technologies and the accumulated experience of surgical treatment of chest deformities did not lead to a unified opinion, approach, and the type of surgical treatment [6].

The issues of early and full rehabilitation and adaptation of patients, after surgical treatment, are also relevant, they are important both individually for each patient and socially for modern society. After all, it is the active social group of people, specifically young men aged from 14 to 25 (59.09% of the total number of patients), of population who are able to work, appeal to a specialist about this disease and are in need of surgical treatment, due to a decrease in normal physical activity and working ability [5,6,10].

## MATERIALS AND RESEARCH METHODS

The study is based on the analysis of the separated results of surgical treatment of 78 patients with funnel-shaped deformation of the chest, for 8-year period, who were undergoing treatment in the children's surgical department of the 1FSBI «CCH with clinic» AP RF and Regional center of pediatric surgery of Krasnoyarsk RF.

The distribution of patients included in the study was performed according to the type of surgical treatment. Group I comprised of 59 patients operated according to the Nuss method at the age from 7 to 18 years, group II consisted of 19 patients operated according to the Ravitch method, at the age from 14 to 18 years. In this work, the classification of PE by V.K. Urmonas (1975) was used. It takes into account the degree of deformity, shape and stage of the disease [5] (table 1).

The distribution of patients by age groups, degree of funnel-shaped deformation of the chest and the type of

surgical treatment are presented below (Table №. 1).

The patients in adolescent age with a third degree of deformity of the chest (79.48%) were in prevailing number. 2.5% of cases of patients with PE were secondary, as a result of mid thoracotomy, children were operated during the neonatal period, in 97.5% of cases, PE was a congenital malformation of the chest, manifested in different ages - from 4 years and older. With the relapse of PE there were 2 patients who manifested themselves during the first 2 years after the operation by Ravitch. In 1 case, the relapse was observed after the minimally invasive thoracoplasty according to Nuss, associated with the early removal of the plate, 2 years later, at the age of 16 years. Primary thoracoplasties in all cases were performed in other medical institutions.

Concerning the surgical treatment, earlier, thoracoplasty in patients with PE was performed according to the Ravitch method, which, despite its effectiveness, was extremely traumatic for patients and was accompanied by a pronounced cosmetic defect. The risk of relapse for this type of surgical treatment is often high [6].

Today we use only the Nuss method, both genuine and in author's modification. The plate is held retrosternally, from side mini-passages, under optical or manual control, which reduces operational risks and traumatism. The time of surgery is reduced and allows to carry out early vertical adjustment and rehabilitation of patients. And in sufficient periods of stabilization (the period of plate standing up to 4 years) excludes the relapses to single cases [4].

The main tools for assessing the quality of life are questionnaires. One of the widely used common questionnaires is the short form Medical Outcomes Study Short Form (SF-36), developed by J. E. Ware et al. in 1988 [2, 3, 11].

The SF-36 questionnaire (Engl. The Short Form-36) is a nonspecific questionnaire for assessing the quality of life of a patient, widely used in researches of quality of life in Europe and the United States. The questionnaire reflects the general well-being and the degree of satisfaction with those aspects of human life that are affected by the state of health [8,9].

SF-36 consists of 36 questions, grouped into eight scales: physical functioning (RF), role activity (RP), physical pain (BP), general health (GH), vitality (VT), social functioning (SF), emotional state (RE) and mental health (MH), as well as an assessment of well-being compared to last year (HH). The indicators of each scale are designed in such a way that the higher the value of the indicator (from 0 to 100), the better the score on the selected scale. Of these, two parameters are formed: the psychological and physical components of health.

To create a comparative scale of evaluation of instrumental research methods data and clinical data, a comparison group was compiled from 25 children aged 12 to 18 years without the pathology of the skeleton of the chest and thoracic cavity (Table 2).

Table 2 also shows the data of clinical manifestations, the complex symptoms, of patients with FDC depending on the degree of deformation, in a comparative position with the control group of «healthy» children in this nosology.

Thus, patients with deformity of II grade had complaints of frequent respiratory diseases, increased fatigue and dyspnoea during physical exertion. In third degree of deformity, children were complaining of irregular heart rhythm and pain behind the sternum.

As for the survey itself, we used the Russian version of the SF-36 questionnaire.

The survey was conducted using a telephone interview, a written questionnaire and an interactive on-line questionnaire. The obtained data was subjected to statistical processing with the calculation of the reliability of the differences.

**Table 1**

**The distribution of patients by age groups, the degree of chest deformity and type of surgical treatment, abs.number, %**

| Age | II stage | | III stage | | Total |
|---|---|---|---|---|---|
| | Group I | Group II | Group I | Group II | |
| School, 7-11 years | 5 (6,4) | - | 10 (12,82) | - | 15(19,24) |
| Adolescent, 12-18 years | 9 (11,5) | 2 (2,5) | 35 (44,87) | 17 (21,79) | 63 (80,76) |
| Total | 14 (17,94) | 2 (2,5) | 45 (57,69) | 17 (21,79) | 78 |

## RESULTS AND DISCUSSION

The healthy children we examined showed high physical activity, which was close to the maximum possible evaluation, what in comparison with the data of children with a PE before the operation, 47.6 ± 2.04 were quite contrasting indicators (Table 3).

Analysis of the quality of life parameters of children with PE before surgery and healthy children of different age groups showed statistically significant differences ($p < 0.05$) in all scales of the SF-36 questionnaire. Our study showed that aspects like RF were most affected, which was reduced to 47.6 ± 2.04 before the operation, which is almost 2 times lower compared to the control group (98.5 ± 1.06). We have found that children with PE in comparison with conditionally healthy children, it is more difficult to lead an active lifestyle. Reflecting this state, the SF index has been reduced to 41.7 ± 2.8.

The possibility of communicating with peers, social adaptation in young children is provided by role functioning. Frequent (sometimes long-lasting) absenteeism in educational institutions, with frequent respiratory diseases, chest pain, dyspnoea - were 4-5 times more likely to

**Table 2**

**The frequency of clinical manifestations in children with PE depending on the degree of deformation of the thorax (n=78) considering the control group (n=25)**

| Complaints | Control group (n=25) | | Дети с ВДГК | | | |
|---|---|---|---|---|---|---|
| | | | II degree (n=16) | | III degree (n=62) | |
| | abs. | % | abs. | % | abs. | % |
| Frequent respiratory infections | 2 | 8 | 12 | 15,3 | 30 | 38,46 |
| Fatigue, weakness | 2 | 8 | 7 | 8,97 | 44 | 56,4 |
| Dyspnea on exertion | 3 | 12 | 13 | 16,66 | 32 | 41 |
| Abnormal heart rhythm | - | | 2 | 2,5 | 7 | 8,9 |
| Pain in heart and chest | - | | 5 | 6,9 | 9 | 11,5 |

develop in patients with PE, in contrast to the children of the control group - excluding children from the active lifestyle of the collective , which contributes to the formation of social dysadaptation. In the study of role functioning (RP), when analyzing the obtained data, regardless of age, it was found that children with PE (RP - 40.7 ± 5.29), compared with conditionally healthy children (RP - 96.3 ± 2.3 ), had difficulties in completing assignments at school, skipping classes due to poor health or in need to visit a doctor.

In much less degree the decrease in parameters of RE was noted - by 25% in the study groups before the operation (67.2 ± 4.87), when compared with the control group (92.2 ± 11.8). During the analysis of obtained data, it was found that, regardless of age, children with PE, compared with healthy peers, are more likely to experience a feeling of fear, anger, dejection or sadness, restless sleep.

The overall quality of life score was significantly different from that in the control group, in the clinical group (before surgery) the decrease of it by30.1-30.6%, ($p < 0.05$) was noted. However, there were no significant differences before the operation between two groups.

In analyzing the parents' answers, the same results were obtained. So, in their opinion, the quality of life of children with PE, before surgery in both study groups was significantly lower than in peers of the control group, in all constituent aspects ($p < 0.05$). At the same time, all parameters were reduced evenly.

The indicators of general health perception (GH) and emotional ability to engage in the usual activities (RE) in children before the operation fluctuated within a sufficiently low level, despite the active adolescence period, and were 49.9 ± 2.03 and 67.2 ± 4, 87 points respectively.

Thus, the quality of life in children with PE before the operation was significantly reduced, in all scales of the SF-36 questionnaire and indicators of clinical and instrumental examination. They have acute decreasing in physical and social activity, the emotional status is falling, subjective estimations of an emotional condition, mood and, as a whole, the general state of health are considerably lowered. Thus, the quality of life in children with PE before the operation was significantly reduced, in all scales of the SF-36 questionnaire and indicators of clinical and instrumental examination. At them physical and social activity sharply decreases, the emotional status falls, subjective estimations of an emotional condition, mood and, as a whole, the general state of health are considerably lowered. The SF-36 questionnaire proved to be a highly sensitive tool for analyzing the decrease in the quality of life of children with these diseases, since it also reveals such evaluation criteria as the patient's psycho-emotional status that often does not play a big role, either for parents or for doctors when deciding of the operational treatment, often such patients are quite self-loathing and feel «outcast» in the school environment because of this defect.

When comparing the two types of surgical treatment, a significant difference in the groups was also obtained. In Table 3, in groups I and II, data from a questionnaire conducted in one year after operation is presented.

Thus, comparing the indicators before and after the operation, it is possible to identify the fact that, indices that reflects the physical statement (RF, RP, BP, VT, CH) increased in group I by 40-50%, compared with preoperative indicators, indexes that reflects the psychological statement (GH, SF, RE, MH) in this group increased by 30-40% and amounted to an average of 87.65 ± 3.17 points.

In group II, the indices that reflects the physical statement (RF, RP, BP, VT, CH) did not make such a significant difference (70.1 ± 3.4), compared to the preoperative indices, the average gain for these indices was from 15 to 20%. This statistic was also observed in indices that reflects the psychological statement of patients (GH, SF, RE, MH).

Attention is drawn to one of the indices that reflects directly the very operative intervention - physical pain (BP) - in patients of the first group this indicator was 88.5 ± 4.09, and in the second group 64.4 ± 3.31. That, in the opinion of the patients themselves (in 84.2% of cases), is caused by aching pains in the chest area during the formation of a correct posture (extension of the shoulder girdle and extension of the back), also a decrease in tactile sensitivity in the area of the operating scar is noted. In group I, patients in 17% of cases note a bursting feeling during deep inspiration and dilatation of the shoulder girdle, also in 8.5% of cases a feeling of discomfort in the area of fixation of the plate (on the lateral surface of the chest) during a prolonged position on the side, during the night sleep is noted.

Thus, in the comparative analysis of the results of the operative intervention according to Ravich and Nuss, already 1 year after the operation, based on the opinions of the respondents, significant differences between the groups were found. The quality of life of children of the first group was significantly higher than that of the second as in the general score, and in the aspects of physical, social and role functioning ($p \leq 0.05$).

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**Table 3**

**The quality of life in healthy children and children operated on Pectus excavatum**

| Scale | Control group (n = 25) | | | |
|---|---|---|---|---|
| | | Before surgery (n=35) | Group I (n =59) | Group II (n = 19) |
| PF- Physical functioning | 98,5±1,06 | 47,6±2,04* | 94,3±3,16* | 81,5±3,13* |
| RP- role of physical problems in limiting life activity | 96,3±2,3 | 64,7±5,29* | 80,4±3,81* | 64,4±3,31* |
| BP- biological pain | 96,4±3,30 | 40,3±3,12* | 88,5±4,09* | 69,8±3,17* |
| GH- General perception of health | 95,4±5,40 | 49,9±2,03* | 88,9±2,03* | 77,5±4,05* |
| VT- vitality | 99,3±5,04 | 44,4±2,20* | 94,4±4,60* | 77,5±4,20* |
| SF- Social functioning | 90,0±8,60 | 41,7±2,8* | 86,7±2,8* | 76,7±3,1* |
| RE- The role of emotional problems in the restriction of vital activity | 92,2±11,8 | 67,2±4,87* | 88,6±3,43* | 70,2±3,81* |
| MH- Mental health | 90,2±6,28 | 40,3±1,60* | 86,4±2,76* | 79,6±2,36* |
| CH- comparison of health state with the previous year | 87,5±6,40 | 70,9±2,21* | 94,7±3,44* | 70,3±2,56* |

Note. In groups I and II, data from a questionnaire conducted in one year after operation are presented, *$p<0.001$.

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# CLINICAL FEATURES OF THE MAIN TRAUMATIC INJURIES IN CHILDREN OF THE FIRST YEAR OF LIFE

**ABSTRACT**

The main types of traumatic injuries among children of the first year of life are birth and burn injury. Since the small age of the patients, inability of verbalizing complaints, the lack of precise staging of traumatic shock, low specificity of some symptoms of shock (for example, symptom of «white spots»), there is needing for an objective criteria's of the severity condition, which proved an appointment of the fluid therapy, analgesia.

The **purpose** of this study is to improve the quality of treatments children with a birth and a burn injury through comprehensive examination, taking into account not only the nature of the injury (type, location, area, depth of the lesion), but the degree of pain, clinical indicators of central hemodynamics, parameters of electrocardiogram (ECG). We examined 67 children with birth injuries at the age of 28 days of life (kefalogematoma, fractures of clavicles, humerus and femur) and 30 children with burn injury at the age of 1-12 months, were respectively treated at the Department of surgery for newborns and the burn unit Voronezh hospitals №1, №2. So, the children of the first year of life with traumatic injuries, in addition to the changes in special status, hemodynamic (decrease in blood pressure, tachycardia or bradycardia), had changes of ECG (shortening of RR intervals, QT, the increase in SP), NIPS scale, ultrasound of the brain and internal organs due to birth injury (periventricular edema and hypoxia; diffuse changes of kidneys, hemorrhage in the adrenal glands) and laboratory data (anemia, leukocytosis, compensated metabolic acidosis).

The presence of detected changes points to the need for a comprehensive examination of children first year of life with traumatic injuries. Treatment must be not only of special surgical treatment (puncture of cephalhaematoma removed, immobilization; dressing, necrectomy and autografting for burns), and the designation of analgesia, infusion therapy.

**Keywords:** birth injury, burn injury, newborn, cardiovascular system, hemodynamics, electrocardiography, intensive care.

## INTRODUCTION

According to Rosstat, in Russia there is a growth in the number of patients within the first year of life with injuries of different genesis (from 16.6 thousand in 2000 to 26.4 million in the late 2008) [1]. The main types of traumatic injuries in children of first year of life are birth and burn injury. Along with the special clinical manifestations of injury (local status), there is a need for objective criteria of severity, depending primarily on the functioning of the cardiovascular system. They can serve as indicators of blood pressure (BP), heart rate (HR), severity of pain, the data of instrumental examination of the cardiovascular system. One of the public methods of investigation of cardiovascular system in children the first year of life is electrocardiography. Intervals, complexes, segments of the ECG correspond to the phases of the cardiac

cycle: atrial systole (tooth P); the systole of the ventricles (QRST complex); ventricular diastole (segment T-P) [2].

**The research objective** - to improve the efficiency of diagnosis and treatment of traumatic injuries in children of first year of life.

## MATERIAL AND METHODS

In the clinic of pediatric surgery (Voronezh hospitals №1,№2,) for the last 2 years we observed 67 children (29 girls and 38 boys) with birth injuries at the age of 28 days of life (group 1) and 30 children with burn injury (13 girls and 17 boys) aged 1 to 12 months (group 2). Upon admission to the surgical hospital, and within 3 days after hospitalization, was conducted by dynamic inspection systems, was measured blood pressure