METHODS OF MOBILIZATION OF SPINE DEFORMATION IN PATIENTS WITH SCOLIOTOMIC DISEASE

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Abstract. *This article presents the results of the application of the method of special physical training testing by traction in scoliotic disease. Test stretching was carried out on a specially made gravitational frame daily 1-2 times a day for 30 minutes after the patient active performed movements in a supported position. When the maximum mobility of the deformity was reached, the traction course was stopped, and the results of the study were analyzed. After the analysis, we took the tactics of the surgical decision, outlined the plan of operations and prepared the patient.*

Keywords: *scoliotic disease, coronary traction, preoperative preparation, children and adolescents.*

Relevance. In the complex of surgical treatment of scoliotic disease, the need for radiological assessment of mobility " mobility " and flexibility of scoliotic deformity is generally recognized and forms an integral part of preoperative planning, being an important means of making a surgical decision and predicting the outcome of the operation (Lamarre , 2009).

Despite the variety of methods, due to the lack of standard criteria among surgeons, there is no common understanding of which deformities should be considered mobile or flexible, and which ones are reliably rigid or fixed, this leads not only to the choice of incorrect treatment tactics and the occurrence of complications, but also to allows you to reliably compare treatment results and evaluate the effectiveness of the surgical correction methods used. (Kleeps, 2001; Cheh, 2007; Lamarre, 2009.)

Purpose and research: development and implementation of a method for mobilizing spinal deformity in patients with scoliotic disease.

Materials and methods of research: In the period from 2001 to 2022, patients with indications for surgical treatment for scoliotic disease, on an outpatient basis, at the clinical bases of the Republican Center for Children's Orthopedics (RCDO) and the Tashkent Pediatric Medical Institute (TashPMI MZRUz) were given preoperative preparation in the form diagnostic and treatment complex, which included a series of tests using standardized systematic functional traction on a gravity frame. A total of 207 patients were selected for the study, 31(15.2%) male and 176(84.8%) female with a mean age of 15.46±3.02 (8-28), mean Risser sign value of 3.29± 1.52 (0-5).

The main scoliotic curve is 88.7 ° ±35.4 ° (39-182 °). The structure of the study was dominated by "pure" scoliotic deformities 61.9% (122), thoracic localization 60.9% (120), mostly right-sided 81.7% (161). Idiopathic scoliosis was diagnosed in 179 (84.8%) cases, congenital in 18 (6.6%), Recklinghausen's neurofibramatosis in 8 (4.1%), Marfan syndrome, Ehlers-Danlos syndrome and iatrogenic causes of scoliosis in 2 (1) cases. %) of the case. The research methods used in the work were: clinical, radiological, anthropometric, statistical, functional: SSEP, FVD, clinical and laboratory ECG, MSCT, and MRI.

Results of the study : The complex impact on the patient began with the use of traditional general physical training, general strengthening physical training for the cardiopulmonary and muscular systems (running, strength exercises, lying down, pull-ups, jumping, outdoor games, etc.), in parallel, muscle massage was performed back in a course of 20 sessions once every two or three months and therapeutic exercises, the latter necessarily includes exercises to stretch the concave side of the deformity: bending in the opposite direction of the deformity, hanging on the "Wall Bar" on one arm on the concave side.

Upon completion of 3-5 massage procedures and training, we began traction on a gravity frame.

Before the start of traction, MRI studies and radiography of the cervical and upper middle spine were performed in two projections to identify anomalies and syringomyelia. The method of special physical training and traction testing through systematic repeated suspensions is not only a means of functional preventive action aimed at increasing the patient's adaptive abilities, but also a standardized tool for systematic control by determining and assessing the test and measuring his physiological state.

Based on the results, personalized preoperative planning was carried out, prediction of treatment outcomes, development of neurological, osteo-destructive and somatic complications during instrumental correction of spinal deformity. Traction due to suspension on a gravity frame, carried out as part of a preoperative diagnostic and treatment course, was aimed at solving the following problems:

1. Standardized achievement of the physiological level of maximum mobility and flexibility by the value of the functional component of the deformity;
2. Removing the patient from a state of chronic hypoxia, increasing the reserve of physiological compensatory capabilities of the respiratory system;
3. Physiological increase in the threshold of tolerance of neurovascular elements of the spinal canal to the conditions of surgical reconstructive-corrective effects;
4. Preoperative determination of the need for mobilizing discectomy, localization of spinal fusion, resolution of the fixing elements of the implanted structure, the possibility of restoring/preserving balance;
5. Predicting the results of instrumental correction of scoliosis and the risk of developing neurological disorders;
6. Determination of the degree of mobility and flexibility of deformation.

Test traction was carried out on a specially made gravitational frame; an individual head holder was made from polyvik for the patient, which was put on the patient, fixing the neck and head; a thick soft pad (towel, foam rubber, porous rubber) was first placed between the head holder and the head, and the straps of the head holder were thrown onto the traction bracket (Fig. 1a, 1b, 1c.)

Fig. 1 (a, b, c) a) front view of the patient with the head holder on before traction; b) rear view of the patient in a standing position before traction; c) rear view of the patient, hanging in the unsupported "Free hanging" position in traction.

Traction was carried out daily 1-2 times a day, for 30 minutes, after bringing the free hanging time to 5 minutes, the patient could perform active movements in an unsupported position: "swinging to the sides"

Fig.1a

Fig.1b

Fig.1c

Fig.2a

Fig.2b

Rice. 2.3 a, b rear view of a patient performing the exercise “Swinging to the sides” in an unsupported position.

Rear view of a patient performing sideways rocking exercises in an unsupported position. At the stages of traction, various studies were carried out, and the data obtained were entered into individual tables and graphs. When maximum mobility of the deformity was achieved, the course

of traction was stopped, and the results of the study were analyzed. After the analysis, surgical tactics were adopted, a surgical plan was outlined, and the patient was prepared.

Fig. 3 (a, b, c) view of a patient performing exercises in an unsupported position: a) "bending the torso back"; b) "bringing the legs to the chest" rear view; c) "bringing the legs to the chest" side view.

At the end of each lesson, measurements of the length of the torso were taken in a standing position and when hanging freely using a spring-loaded meter tape with a division value of 1 mm. The distance between the spinous processes of the C_7 and S_1 vertebrae (posterior distance) and from the jugular notch to the pubis (anterior Makarov distance) was measured with an accuracy of 5 mm; the difference in distances while standing and when hanging was recorded. A systematic increase in the anterior Makarov distance indicated the progressive mobility of the kyphotic component of the deformity, and a similar increase in the posterior one indicated the progressive mobility of its scoliotic component; the degree of mobile deformation was quantified in centimeters by calculating the difference between the length of the body and the standing and extended position. In addition, the duration of the entire traction course, the number of classes performed in the course, the duration of one lesson and the duration of the free hang in seconds were recorded. The last value reflected the degree of patient's tolerance to traction.

The average bed-day spent on the preoperative complex was 48±0.23 days (from 30 to 60 days).

The following level of spinal deformity mobility was achieved during this period: the average time spent hanging on a gravity frame in an unsupported position was 649±2.86 seconds; the distance in the groups increased by 8.6±0.41 cm; The angle of the scoliotic curve decreased by an average of 48.3±0.63% and 31.6±0.52%; kyphotic arch by 78.1±1.21.

The data obtained confirm an increase in the physical endurance of patients to traction. An increase in the posterior distance at the end of each extension indicated a gradual increase in the extensibility (mobility) of the deformed torso to an average of 3.9 ± 0.01 cm, with a final stabilization of extensibility on average at 3.6 ± 0.01 cm.

In the process of preoperative preparation, regression of the force paralysis that occurred in one patient was achieved.

Discussions: Determining the mobility or correctability of scoliotic deformity is a mandatory means of functional diagnosis in preoperative planning of surgical treatment of scoliosis. Traditionally, the mobility of the main scoliotic curve is tested using radiography under conditions of a non-standardized external corrective effect on scoliosis. The body is tilted to the sides “Bending radiographs”, pressure on the apex of the curvature, or various combinations of these effects in the supine position, on the stomach with manual pressure on the apex of the curve, as well as standing with the side and lying on the side with the apex of the deformation resting on the roller, “fulcrum bending radiograph”. [Lamarre , 2009; Vedantam R , 2000; Hamzaoglu A , 2005; Cheung , W. _ Y. , 2010; Cheh G. , 2007; Klepps 2001; Davis , 2004]

In addition, axial traction of the torso is used in the supine position, manual or mechanical, as when the patient is clearly conscious [Davis, 2004; Hamzaoglu , 2005;], and under general anesthesia [Hamzaoglu , 2000], as well as when suspended by the “armpits” Lamarre , 2009], sometimes in combination with additional hand pressure on the apex of the curvature. [Davis, 2004] Despite the variety of techniques, to date there are no standardized methods for determining personalized mobility or flexibility of scoliotic curvatures, since the strength and localization of the applied corrective action can vary significantly, not only among different researchers, but also within one study . [Klepps 2001 Davis 2004; Lamarre, 2009 Cheh,2007] This makes it difficult to make a fully informed surgical decision, leads to ambiguous repetition, errors in planning surgery and predicting outcomes [Klepps 2001 Cheh, 2007 Lamarre,2009] Inaccurate, heterogeneous ideas about mobility not only potentially limit surgical correction and cause complications, but do not allow one to compare and systematize the results obtained, which distorts reporting and complicates scientific debate. [Lamarre, 2009] Until now, the effects obtained from systematic traction on the body of patients with scoliotic deformities have not been studied.

The nonlinear, viscoelastic properties of the muscular-ligamentous apparatus, which indicate that the extensibility of the deformity of the spine and chest can be equally determined by both strength and duration, have not been studied and are not taken into account by most researchers when carrying out preoperative corrective effects on scoliosis. corrective effect. The nature and possibilities of immediate and long-term adaptive changes in skeletal growth, functioning of the cardiovascular, pulmonary and nervous systems in response to systematically repeated, prolonged corrective effects of traction in a developing organism are unknown.

Halo-traction, [Cit. According to Dewald, 1970; Edgar, 1982 Floman, 1982] permanent halo-pelvic or halo-gravity version of traction is used as preoperative preparation in the complex of surgical treatment of severe and rigid forms of scoliosis for prevention of intraoperative complications, determination and increase in curvature mobility and improvement of surgical correction rates. [Rinella, 2005; Hamzaoglu, 2008; Sponseller, 2008; Jasiewicz, 2009; Watanabe, 2010; Caubet, 2011; Song,2011; Kulkarni, 2013; Park, 2013 Koller, 2012] . However, the use of such traction is extremely limited, since being an independent surgical intervention has a high risk (50% or more) of complications, significant selectivity, labor intensity, invasiveness and duration [Rinella, 2005 Sponseller, 2008; Qian, 2006; Park ,2013]. To date, no universal, resource-saving and atraumatic clinical alternative has been proposed as a counterbalance.

Conclusion: The therapeutic and diagnostic complex of preoperative preparation based on systematic suspension traction is a standardized, effective and safe means of personalized functional diagnostics, prognosis, and therapeutic and preventive development of mobility of the deformed spine and chest with scoliosis. When using it, surgical methods are not used to increase

surgical correction, improve external respiration function, and prevent the development of various perioperative complications. A multi-stage traction control system, including additional means of visualization, recording and data analysis, makes it possible to increase the efficiency of preoperative planning and prediction of correction, and to determine the risks of perioperative complications.

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