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SURGICAL CORRECTION OF FUNNEL CHEST DEFORMITY IN CHILDREN WITH USE OF IMPLANTS FROM NITINOL

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INTRODUCTION. Congenital deformations of a thorax represent the malformations connected with change of its form. Most often funnel chest deformity (pectus excavatum (PE)) meets [1]. Except cosmetic defect this malformation is followed also by functional violations from cardiovascular and bronchopulmonary systems. According to authors of Russia PE meets at children from 0,06 to 2,3%, and according to foreign authors from 0,2 to 1,3% [3].

Surgical treatment of PE at children is one of the most serious and actual problems of thoracic surgery. Now there is a set of methods of a thoracoplasty [2]. Improvement and widespread introduction of low-invasive and hi-tech methods in surgical treatment of funnelchest deformity is a step forward in this direction [3, 4]. However, questions of optimum tactics of treatment of patients concerning the choice of a way of the thoracoplasty and ways of fixing of a sterno-costal complex are actual and unresolved nowadays.

Surgical correction of deformations of a thorax has to be timely and full. It promotes improvement of function of cardiorespiratory system and carrying out early rehabilitation of patients. For this purpose we have used an author's method of surgical treatment of funnel chest deformity in the conditions of the growing organism with use of smooth biocompatible composite materials from a nitinol, which have biological inertness, isoelasticity and effect of shape memory.

The purpose of this study was to create a device which allows conducting a pectoral plate without risk of damage to internal organs in difficult anatomical



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conditions. The task of the proposed method was to facilitate the insertion of the plate in difficult anatomical conditions by using a guide pin connected to a plate by cord. In the clinic of the medical university in Tomsk, 43 children with PE were operated by an authoritative method.

MATERIAL AND METHODS. The device consists of a guide pin made of stainless steel with a length of 350 mm and a thickness of 3 mm with a handle of 100 mm having an oval-shaped bend 15°. At the top of the conductor there is a hole 3 mm in size through which a kevlar cord 5 mm thick and 10 mm long is fastened, the other end of the cord is fastened to the hole in the implant plate with a width of 15 mm 2 mm thick, 30 cm long, pre-adjusted based on the anatomical deformation and the degree of necessary correction. When using the device retrosternal carrying out is made in one stage, at the expense of very short (1 cm) kevlar cord bridging the conductor and a plate. Thanks to addition of efforts — pulling (for a guide pin) and forward (on a plate) carrying out a plate in difficult anatomic conditions of retrosternal space is facilitated. It warns an internal injury and tissues that it reduces risk intra- and postoperative complications.

Appearance of a thorax of the patient with PE before operation and in 3 years after treatment with use of a plate from a smooth nitinol with shape memory is presented in the Fig. 1.

RESULTS AND DISCUSSION. In the long-term postoperative period, we received complications in the form of a rupture of a smooth plate of nitinol lavesan ribbon fixing to the rib in 2 children (0.8%). This type of complication on outcome of treatment of patients was not affected. And in one patient (0.4%) during progressive growth, the existing scoliotic deformity increased, which led to secondary deformation of the chest above the established plate. The patient was operated again, she was given a second plate.



Fig. 1. Appearance of a thorax of the patient with PE, before operation (a) and in 3 years after treatment with use of a plate from a smooth nitinol with shape memory (b)

The rupture of the lavalan tape is related to the failure to follow the prescribed regime (the child was engaged in wrestling).

CONCLUSIONS. Using the author's method makes it easier to load the plate in difficult anatomical conditions, reduce the traumatism of the intervention and shorten the duration of the operation, reduce the risk of damage to the vital organs of the chest, improve the aesthetic outcome of the operation, and simplify the operation technically.

The use in the clinic of the author's method of surgical correction of patients with PE made it possible to obtain good results in 95.4% of cases and satisfactory results in 4.6%. The absence of unsatisfactory results gives grounds to recommend and use the tactics developed by us for the surgical treatment of patients with chest deformities using smooth plates of nitinol in practical activities.

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