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INDICATIONS FOR SURGICAL TREATMENT, CLASSIFICATION OF SCOLIOTIC SPINAL DEFORMITIES

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ABSTRACT

This article analyses the classification of various forms of scoliosis. Indications and contraindications for surgical treatment of scoliotic disease in children and adolescents have been determined.

Key words: analysis, scoliosis, classifications, children and adolescents, surgery.

INTRODUCTION

Scoliotic deformities or scoliosis is a general term that unites a large group of multiplanar structural lateral curvatures of the spine, often combined with hyperkyphosis and hyperlordosis. Each individual curvature is different from the others in its origin, pathogenesis, severity of manifestations and the nature of concomitant pathology, and, therefore, requires the use of its own unique treatment methods with their individual effectiveness, risks and outcomes.

It should be remembered that surgical treatment of scoliosis does not have a pathogenetic focus, but is rather a therapeutic and prophylactic attempt to correct and stabilize the progression of individual pathological manifestations of the disease. To a large extent, the mechanistic approach to treatment is traumatic and always causes functional limitations, therefore, the justification of the surgeon's actions comes first, not only from the standpoint of physiology, but also in the moral, ethical and social aspects.

The goal of surgical treatment of scoliotic curvatures is "3D correction" of deformation of the spine and chest, restoration of sagittal and frontal balance, achieving reliable synthesis of vertebrae subjected to instrumental influence with maximum preservation of functions [Matyushin A.F. with co-author, 2012, Novikov V.V. 2015, Umarkhodjaev F.R. 2021]. The principles of treatment are based on its medical and social justification, effectiveness and safety, accessibility,

minimizing loss of activity and physiological functions, achieving early mobility and rapid return of patients to normal functioning without restrictions.

Indications for the surgical private sector were established along with observation at the initial stages of the development of instrumental surgery for scoliosis, but their components are still being created, which remain a topic for debate in the study of idiopathic scoliosis [3, 4, 7, 15, 14, 16, 12]. There are generally accepted criteria for indications, however, the decision to perform correction and spinal fusion must be made individually, based on the individual etiology, pathophysiology of the disease and broad social differences for each individual patient [16].

Traditional indications for surgery are scoliotic curvatures with a Cobb angle of the main scoliotic curve that exceeds 45-50° in skeletal maturity, or that exceeds 40-45° degrees in patients with incomplete growth. These criteria were chosen on the basis that curvatures greater than 45º-50º progress even after skeletal maturity [14,16]. Thoracolumbar curvatures, reaching 50º-60° during maturity, are recommended to be operated on due to asymmetries of the trunk and displacement of the vertebrae [16]. Regarding the indications for S-shaped scoliosis with equal curves and lumbar curvatures, there are no clear decisions, so it is recommended to follow the tactics of restrained conservatism. In such a situation and in borderline conditions, one should always take into account the motivation of the patient and his legal representatives, who persistently want or do not want to correct the scoliotic curvature surgically, especially if the Cobb angle of the main scoliotic curve is in a doubtful zone and is calculated at 35º-45º [12].

According to various authors, there is every reason to agree with the above reasons and arguments presented in the literature, and therefore it is advisable to consider the indications for elective surgery for moderate scoliosis with a Cobb angle of 40-60º as relative [5].

The classification system for idiopathic scoliosis is an element of standardization and is intended to help systematize the manifestations of the disease, to facilitate professional understanding and comparison of treatment results, simplify contacts, guide the strategy of the chosen treatment method and predict outcomes.

Based on three different age peaks of clinical manifestation of idiopathic scoliosis, which are associated with periods of rapid growth of the spine, three groups were defined; infantile idiopathic scoliosis – under the age of 3 years; juvenile – from 3 to 10 years of age and teenage – from 10 to 18 years [8].

Classification of thoracic curvatures proposed by King H.A. et al., identified 5 main types of scoliosis and was fundamentally different from previous

classifications [9]. It was created in order to justify the extension of spinal fusion to the lumbar segments of the spine when planning surgical intervention for thoracic scoliosis. The classification made it possible to keep the lumbar spine intact when correcting thoracic scoliosis, relying on self-correction of the lumbar countercurvature arc, which often not only reduced the risk of developing pseudarthrosis and progression of both scoliotic curves in the long-term period, but also prevented the development of trunk imbalance. Lonstein et al. In 1994 proposed a classification considering seven variants of scoliotic deformities, which did not contain any practical recommendations on the tactics of treating scoliosis and therefore was almost never used in practice [11]. Conrad et al. In 1998, they identified 21 variants of deformities in their classification, which were reduced to 11 types, each having 2 variants according to the right and left sides. The classification also systematized and gave an idea of the frequency of distribution of certain types of scoliosis based on statistics, but was mostly of theoretical interest [6].

Classification Lenke L.G. et al. Was an algorithm for selecting levels of spinal fusion when planning surgical correction of scoliotic spinal deformity. It made it possible to systematize 48 different types of deformities, including all types of scoliotic curves and the sagittal profile of the thoracic spine [10]. Currently, a large number of publications refer to this classification and it can be considered quite effective, since after its widespread implementation the number of tactical options for surgical treatment of scoliosis has significantly decreased, but it takes into account the state of the sagittal contour to a small extent [10].

The SRS classification for adult spinal deformities uses multiple parameters such as primary curve location, lumbar degenerative modifier, global balance modifier, adult spinal deformity modifier, SRS definition of regions, and major curve type criteria. The (Beijing Union Medical College) classification (PUMC16) takes into account the rotational deformity of scoliosis and is based on the location of the apexes of the scoliosis curves, the magnitude and flexibility of the deformity, the severity of apical rotation of the vertebrae, and the presence of thoracolumbar kyphosis. It defines more stringent criteria for selective thoracic fusion for patients with double curvature with thoracolumbar and lumbar curvatures less than 45° and flexibility greater than 70%, with apical rotation of the vertebrae less than class 2 according to Nash and Moe [13]. Despite the listed advantages and versatility, this classification is too cumbersome for clinical use and has a number of disadvantages, among which the most important is the use of non-standardized methods for determining the mobility of scoliosis.

The eventful evolution of numerous classification systems for idiopathic scoliosis, of which almost half are used by clinicians to this day, indicates that at the moment there is no classification that would satisfy all the needs of clinicians. Most classifications do not provide unambiguous answers to key questions regarding in which cases it is sufficient to limit correction to posterior spinal instrumentation, and when it is necessary to perform posterior and anterior segmental mobilization, thoracoplasty, various vertebrectomies and transposition of the spinal cord in order to achieve socially significant correction and avoid complications? Which criteria should be applied so that effective and safe treatment tactics can be personalized? The lack of methods for a standardized, personalized assessment of the degree of mobility of the deformity, the timing and urgency of indications for determining the strategy and tactics of treatment – this is the series of questions that the classification should answer. Unfortunately, we have not found clear answers to this question in modern literature.

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