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Treatment of Dysplastic Coxarthrosis by Total Arthroplasty

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Abstract: *Dysplastic coxarthrosis is a progressive degenerative disease of the hip joint that often leads to early disability due to persistent pain, severe limitation of motion, muscle atrophy, and secondary disorders of adjacent joints and the spine. Long-term outcomes of conservative treatment remain unsatisfactory, as residual developmental defects of the hip joint result in femoral head decentration, joint incongruence, and accelerated cartilage degeneration. Total hip arthroplasty has become the most effective method for restoring joint function in adult patients with advanced dysplastic coxarthrosis; however, the choice of surgical tactics remains challenging due to anatomical and biomechanical abnormalities. This study analyzes modern approaches to the surgical treatment of dysplastic coxarthrosis using total hip arthroplasty, emphasizing the importance of an individualized and differentiated strategy. Particular attention is given to preoperative planning, selection of implant fixation methods, acetabular roof reconstruction, pelvic osteotomies, and staged surgical techniques in cases of high congenital hip dislocation. The results indicate that a biomechanically justified approach, including early corrective interventions and appropriately timed arthroplasty, significantly improves functional outcomes, reduces postoperative complications, and prolongs implant survival. The choice of implant design, fixation method, and surgical technique plays a decisive role in achieving stable long-term results in this complex category of patients..*

Key words: *dysplastic coxarthrosis, total hip arthroplasty, hip dysplasia, acetabular reconstruction, pelvic osteotomy, congenital hip dislocation, surgical treatment..*

Introduction

Despite the above, long-term treatment results indicate an unfavorable prognosis for femoral head decentration. Its discongruent position in the cavity creates an overload of individual sections of the articular surface, being a constant source of irritation, causing a violation of the structure and then the shape of the articular elements with all subsequent manifestations of arthrosis. Significant physical exertion and the influence of external factors, changes in the hormonal background in women during pregnancy, menopause - this is not a complete list of reasons for the completion of the "light gap" between a congenital disease in a child and DKA in an adult. According to the literature, residual defects in the development of the hip joint lead to the development of osteoarthritis in sixty percent or more of cases. The process progresses quite quickly, reaching the terminal stages. The disability of patients with DKA is caused by severe pain syndrome, severe restriction of movement with persistent contracture in the hip joint, atrophy of the paraarticular muscles, disorders in adjacent joints and spine. Conservative treatment of dysplastic coxarthrosis is insufficient, ineffective, and does not stop the progression of the pathological process. The problem of surgical treatment of dysplastic coxarthrosis in adults is determined not only by the severity and frequency of sufferers with this pathology, but also by the lack of a pathognomically sound, individual, differentiated and technologically advanced approach to the medical and social rehabilitation of this complex category of patients. The treatment of hip joint pathology in adults undoubtedly differs from that in children's practice, however, the principle of restoring support capacity, painlessness, and achieving normal functional results should underlie each of the approaches to solving this problem. Corrective osteotomies of the hip and pelvis, arthroplasty options and attempts to

vascularize joint elements in adults, as in children's practice, have a positive effect to a certain extent, but they are not able to completely stop the process of osteoarthritis.

These include choosing the optimal type of implant fixation, taking into account the severity of the process, the insufficiency of joint elements, and much more. Despite the large number of publications, the problem is far from its final solution, as there is no consensus on the choice of tactics for orthopedic aids. The choice of hip replacement depends not only on age, but also on the relationship of the elements of the hip joint in DKA. A differentiated approach to the treatment of patients with DKA provides the best treatment results compared with corrective pelvic osteotomies used in isolation. In case of degenerative-dystrophic lesion in combination with a violation of the mutual orientation of joint elements in patients with DKA, the use of two-stage surgical intervention techniques is optimal. Preliminary plastic surgery of the acetabulum ensures the restoration of anatomical and biomechanical parameters of the hip joint and contributes to a significant reduction in complications during subsequent endoprosthetics. Treatment of dysplastic coxarthrosis in adults should be carried out taking into account the biomechanical relationships of the elements of the hip joint, the stage of the process and the age of the patient. The use of corrective operations on the pelvic component can significantly improve the clinical and radiological characteristics of the hip joint and significantly delay radical interventions, including endoprosthetics. Two-stage surgical treatment, including pelvic osteotomy in the early stages of the process and subsequent hip replacement in its terminal stages, allows young patients to achieve the best results in optimal time. Hip arthroplasty options with a preliminary reduction of the proximal femur with an external fixation device (for high hip dislocations) and the installation of a pelvic component at the level of neoarthrosis (with bilateral BBB) make it possible to avoid postoperative neurological and functional complications.

When determining indications for surgical treatment of patients with DKA, a number of conditions should be observed: treatment should begin as early as possible, which makes it possible to normalize the biomechanics of the joint and, with the development of the terminal stage of the process, perform endoprosthetics, preventing the involvement of the opposite joint and the lumbar spine in a vicious circle. Preoperative planning should take into account the index of femoral head coverage, the height of hip dislocation, single- or bilateral dislocation, and the degree of vertical luxation. In the initial stages of the process, when biomechanical disorders in the joint are pronounced, it is recommended that they be corrected by Chiari pelvic osteotomy. This provides both an improvement in the anatomical and radiological relationship between the pelvic and femoral components of the joint, and allows delaying the need for endoprosthetics, which is desirable due to the limited duration of the implant.

Conclusion. The options of hip replacement with a preliminary reduction of the femoral head by an external fixation device (with high unilateral BBB) and the installation of a pelvic component at the level of neoarthrosis (with bilateral BBB) have undoubted advantages. The choice of hip replacement options (cement, cement-free, acetabulum roof surgery, etc.), as well as the design and manufacturing quality of the implant, undoubtedly affects the outcome of treatment and the duration of its operation.

CONCLUSIONS

1. It was found that the total adrenaline excretion in the HD+IT group was 86.9% (1.87 times) higher than in the control group, and 24.6% (1.25 times) higher than in the HD without IT. A similar trend was not found for norepinephrine, dopamine, and DOPA when applying IT to the HD group: norepinephrine excretion was 16.0% (1.16 times) higher; dopamine - 13.1% (1.13 times), DOPA - 9.9% (1.10 times) - the reliability is statistically significant ($p<0.05$) and reflects pronounced hyperactivation of the sympathoadrenal system (SAS) in young people with HD, especially in IT specialists.
2. Statistically significant changes in the activity of monoamine oxidase (MAO), a key enzyme responsible for catecholamine dominance, were detected in the blood. The average MAO activity in the serum of patients with hypertension and IT was 4.3 U/exc, compared to 4.5 U/exc in patients

without IT and 7.0 U/exc in the control group. MAO activity in patients with hypertension and IT decreased by 38.6% (1.63 times lower) compared to the control group. The decrease in MAO activity indicates a slowdown in the inactivation of catecholamines, contributing to their accumulation and enhancing the pressor effect.

3. An increase in the daily excretion of vanillylmandelic acid (VMA) was revealed. The daily excretion of VMA in the GB+IT group was 15.4 ng/ml, in the GB without IT - 13.7 ng/ml, in the control group - 11.1 ng/ml. Compared with the control, VMA in the GB+IT group was 38.7% (1.39 times) higher, and compared with the GB without IT - 12.4% (1.12 times) higher ($p < 0.05$, CI 95%).

The increase in the level of VMC reflects the method of catabolism of biogenic amines against the background of hyperactivation of the sympathoadrenal system.

4. Malondialdehyde (MDA) levels in the HD+IT group were 86.3% (1.86 times) higher than in the control group, and 18.5% (1.18 times) higher than in the HD without IT ($p < 0.05–0.001$). These data confirm the significant oxidative stress in young people with HD, especially in IT specialists, which may contribute to preliminary vascular remodeling.

The average daily blood pressure in the hypertension + IT group was SBP - 143.9 mmHg, DBP - 93.8 mmHg, hypertension without IT - 146.3/93.1 mmHg, in the control group - 124/79.2 mmHg. In the group of young individuals with arterial hypertension, which occupies the nature of IT activity, the proportion of pathological daytime types of night peakers and non-peakers is high (86%) versus 35.0% in hypertension without IT and 10.0% in the control group (χ^2, $p<0.01$). This indicates a violation of nocturnal recovery, weakening of parasympathetic activity and the preservation of long-term hypersympathicotonia.

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