



Recurrence of Knee Joint Deformities in Children and Adolescents

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Relevance. Knee joint deformities in children and adolescents occur with vitamin deficiency chondrodystrophy or rickets (17.2%), physical dysplasia (14.1%), or their local form, Erlacher-Blount disease (17.2%). In 10.9% of cases, the genesis of the disease cannot be determined. Deformities that can be characterized as acquired are most often the result of hematogenous osteomyelitis or are post-traumatic in nature. In modern Russian and foreign literature, issues related to the clinical and radiological characteristics of knee joint deformities and methods of their treatment have been covered in detail. However, a large number (up to 47% in total) of unsatisfactory results, both in conservative and surgical treatment of knee joint deformities, indicates the continued relevance of the chosen topic and indicates the need to continue its development. In these cases, the recurrence of the deformity is initiated by maintaining the sagging position of one of the condyles of the joint-forming segment. Surgical interventions in the form of subchondral osteotomies, supplemented by dissection or fracture of the bone towards the articular cartilage at the border of the normal and altered areas, were proposed to correct the deformation of the articular plateau. However, in all cases of their use, the formation of an intraarticular fracture with adverse consequences in the form of hemarthrosis, violation of the integrity of hyaline cartilage, and its subsequent degeneration was noted, which contributed to the development of deforming osteoarthritis.

The reasons for the recurrence of knee joint deformities with traditional surgical methods are the non-elimination of deformity of the articular plateau, exceeding 10° in both the frontal and sagittal planes, and the lack of hypercorrection at the meta-physical level of the joint-forming segment in the presence of instability in the knee joint. Surgical treatment tactics are determined by the nature of knee joint deformity. An isolated deformity of the metaphysis of the joint-forming segment involves performing an osteotomy at the top of the deformity with hypercorrection by the angle of instability to restore the anatomical axis of the limb segment. The presence of deformity of the articular plateau determines the need for surgical correction aimed at restoring the congruence of articular surfaces. Indications for surgical correction of the articular plateau are its obliquity of more than 10° in both the frontal and sagittal planes, or hypoplasia of the condyle by $1/4$ in the frontal plane and $1/5$ in the sagittal plane. A method of surgical correction based on the formation of a mobile bone-cartilage fragment has been developed, which makes it possible to restore the congruence of articular surfaces, preserve the integrity of hyaline cartilage and its trophism, and thereby prevent the development of deforming osteoarthritis. A comparative analysis of the results of surgical treatment of knee joint deformities using traditional methods and the proposed method has reliably proved the advantage of the latter with the ability to increase the number of excellent and good results by 1.5 times. Deformity of the joint-forming segment, manifested by an isolated obliquity of the articular plateau of no more than 10° or its combination with an angular deformation of the metaphysis of no more than 15° , can be corrected by performing osteotomy in the metaphysical zone of the joint-forming segment. When the articular plateau is deformed by more than 10° (regardless of the presence or absence of an angular deformity of the metaphysis) or the articular plateau is hypoplasia by $1/4$ in the frontal plane or $1/5$ in the sagittal plane, the formation of a mobile



bone-cartilaginous fragment with preservation of the integrity of the hyaline cartilage, including the compressed condyle and its displacement by the amount of the femorotubial angle, is shown. In case of instability in the knee joint up to 10° , it is necessary to perform hypercorrection by the angle of instability in order to normalize the biomechanical axis of the limb.

The causes of post-traumatic deformities of the knee joint in children are damage to the growth zones in the distal epiphysis of the femur and the proximal epiphysis of the tibia, which leads to their premature closure in up to 27% of cases. The pathological distortion of the articular surfaces causes an overload of one of the condyles, depending on the type of deformity. In the occurrence of deforming osteoarthritis, mechanical causes prevail over metabolic ones. There is also a need to correct the axis of the lower limb and align the center of the knee joint with the biomechanical axis of the lower limb. In the presence of severe deformities of the distal femur in combination with a shortening of the limb of more than 3 cm, according to a number of authors, it is considered promising to perform two osteotomies: correcting at the level of deformation in the periarticular region and lengthening in the middle third of the segment using the spokes of the Ilizarov rod apparatus.

This provides an opportunity for early rehabilitation, reduces the duration of treatment and prevents the possibility of developing postoperative contracture of the knee joint. Recently, some authors consider it advisable to combine corrective osteotomies with resection of the functioning part of the damaged growth zone, which prevents the subsequent occurrence of repeated deformities and reduces the number of repeated operations. At the same time, there is a lot of contradictory information: about the actual contact area of the condyles, about the contact tension on the articular surface. In children, the distribution of contact pressure and changes in specific pressure in the knee joint under conditions of knee joint deformity, depending on its type, severity and age of the patient, have not been studied in practice.

Conclusion. With higher rates of instability in the knee joint, it is advisable to supplement osteotomy with surgery on the capsular ligamentous apparatus. Thus, when choosing a method for surgical correction of knee joint deformity, all possible causes that may lead to its recurrence should be taken into account. This approach will significantly increase the percentage of positive outcomes in the treatment of children and adolescents with knee joint deformity.

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