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FIBROUS HIP ANKYLOSIS IN ADOLESCENTS: NON-STANDARD APPROACH TO TREATMENT (CLINICAL OBSERVATION)

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The development of secondary deforming coxarthrosis in childhood and adolescence, as a rule, is accompanied by the formation of a pronounced deformity of the hip joint, up to ankylosis, which significantly limits the function of the lower limb and leads to early disability. In most patients, hip ankylosis develops in a vicious position with the resulting flexion-intracavity installation of the lower limb. If such a condition is encountered in childhood and adolescence, treatment currently remains debatable. Various methods are used, ranging from arthroplastic organ-preserving interventions and corrective osteotomies to joint replacement. In this report, we present a clinical case of children treated with post-infectious secondary deforming coxarthrosis with fibrous ankylosis of the hip joint in a vicious position. We applied a coherent combination of modern treatment methods: distraction in the apparatus, arthroscopy, intra-articular injections, physiotherapy, and other rehabilitation. The treatment results were evaluated over a two-year period. In this case, the rational use of a consistent set of remedial measures helped to improve joint function, socialize the patient, and postpone surgery for joint replacement for at least 2 years.

Keywords: secondary osteoarthritis; fibrous ankylosis; hip joint; contracture; arthroscopy; distraction; teens.

ФИБРОЗНЫЙ АНКИЛОЗ ТАЗОБЕДРЕННОГО СУСТАВА У ПОДРОСТКА: НЕСТАНДАРТНЫЙ ПОДХОД К ЛЕЧЕНИЮ (КЛИНИЧЕСКОЕ НАБЛЮДЕНИЕ)

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Развитие вторичного деформирующего коксартроза в детском и подростковом возрасте, как правило, сопровождается формированием выраженной деформации тазобедренного сустава, вплоть до анкилоза, значительно ограничивающей функцию нижней конечности, и приводит к ранней инвалидности. У большинства пациентов анкилоз тазобедренного сустава формируется в порочном положении конечности. При возникновении такого состояния в детском и подростковом возрасте до настоящего времени тактика лечения остается дискутабельной. Используют различные методики, начиная от артропластических органосохраняющих вмешательств, корригирующих остеотомий и заканчивая тотальным эндопротезированием сустава.

В данном сообщении представлен клинический случай лечения ребенка старшего возраста с вторичным постинфекционным деформирующим коксатрозом с фиброзным анкилозом тазобедренного сустава в порочном положении. Применен последовательный комплекс современных методов лечения: дистракция в аппарате, лечебно-диагностическая атроскопия, внутрисуставные инъекции, лечебная гимнастика и другие реабилитационные мероприятия. Результат лечения оценен через 2 года. Рациональное использование последовательного комплекса лечебных мероприятий в данном конкретном случае позволило улучшить функцию сустава, социализировать пациента и отсрочить операцию эндопротезирования как минимум на 2 года.

Ключевые слова: вторичный коксартроз; фиброзный анкилоз; тазобедренный сустав; контрактура; артроскопия; дистракция; подростки.

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Treatment of older children with secondary deforming coxarthrosis and the formation of fibrous ankylosis of the hip joint in a vicious position remain a challenge in the field of pediatric orthopedics. It can be caused by traumatic, infectious, and allergic lesions of the hip joint. In most cases, ankylosis of the hip joint is formed in the position of the adduction-flexion contracture and is facilitated by the excess force of the flexor muscles of the hip and adductor muscles above the extensor muscles of the hip and the abductor group, respectively. Installation of the lower limb in a vicious position severely impairs its function, causes severe lameness, and makes it challenging to perform activities of daily living and socialization. Orthopedists have attempted to restore lost movements by performing arthroplastic surgeries while treating children with fibrous ankylosis of the hip joint [1, 2], including the creation of an interposition of one or another tissue between the articular surfaces (allo-, xeno-, polymeric, and other lining) [3, 4]. Analyses of the results of such surgeries have revealed the fragility of the restoration of joint mobility. On an average, 1–2 years after the intervention, a gradual decrease in the range of movements has been noted, with return of stiffness in 27%–50% of cases [1, 4, 5]. Another method of treatment that became popular in ankylosis in the vicious position of the lower limb is corrective angulation osteotomies of the proximal femur [6, 7]. These interventions aimed to bring the limb to a middle position for improving support function, ensuring hygienic procedures, and enhancing patient independence for activities of daily living. However, in the remote period, most authors note that the angular deformity formed during the child's growth is gradually leveled, almost returning to its original position. In recent years, another negative aspect of angulation osteotomies was discovered in the form of the challenges faced in endoprosthetics after previous "angulations". Adult orthopedists who were required to deal with total hip joint endoprosthetics after correcting osteotomies of the proximal femur found it challenging to install the stem of the femoral component of the endoprosthesis because of the change in the shape of the medullary canal [8–10]. Currently, they highly recommend avoiding various kinds of palliative angulation osteotomies of the hip [11]. The next method of treatment used in clinical practice is hip joint endoprosthetics in adolescents. The first positive results of early endoprosthetics showed potential for a successful solution of the problem of fibrous ankylosis with a vicious position of the limb. However, it was recently revealed that this method involves several serious restrictions related to incomplete skeletal growth and, consequently, an increase in shortening of the operated limb, the problem of repeated surgical interventions to replace the endoprosthesis, severe dysplasia and/or destruction of hip joint structures that complicate the choice of implant and its installation under conditions of bone tissue deficiency, lack of models of a hip joint endoprosthesis, which takes into account all these problems. Thus, this treatment method remains exclusive in adolescent patients [12–14].

This publication presents a clinical case wherein the use of consistent integrated surgical treatment and rehabilitation activities achieved good result and gain precious time.

Patient V., a 13-year-old girl, was first admitted to our clinic with complaints of gait abnormality, movement restriction in the left hip joint, as well as difficulty in performing activities of daily living and schooling because of the inability of sitting at a desk.

The case history revealed that at the age of 8 years, she was injured by a subway turngate and experienced compression of the pelvic bones. In the emergency room at a primary care facility, a left hip contusion was diagnosed. Thereafter, the temperature rose, and there was an increase in the pain in the left hip joint area. Hematoma was diagnosed in the zone of the left iliopsoas muscle, sacroiliitis, and purulent coxitis. Using active therapy, drainage, and lavage of wounds, the acute inflammatory process was stopped. Despite rehabilitation treatment, hip joint contracture was gradually formed in the vicious position of the lower limb because of which, the patient presented to the Priorov National Medical Research Center of Traumatology and Orthopedics at the age of 13 years.

Clinical examination (Fig. 1) revealed severe lameness and forced vicious position of the left lower limb with flexion-adductive-intrarotational contracture in the hip joint. The pelvic distortion, the left half is higher with an anteversion and strengthening of the lumbar lordosis. The relative shortening of the left lower limb due to the vicious position was by 5 cm. The absolute length of the

Fig. 1. Patient V., 13 years old. Diagnosis: "The consequence of septic coxitis. Secondary deforming coxatrosis on the left. Fibrous ankylosis of the left hip joint". Clinical picture at admission: flexion-adductive-intrarotational contracture of the left hip joint, pelvic distortion, increased lordosis, and lower limb length inequality

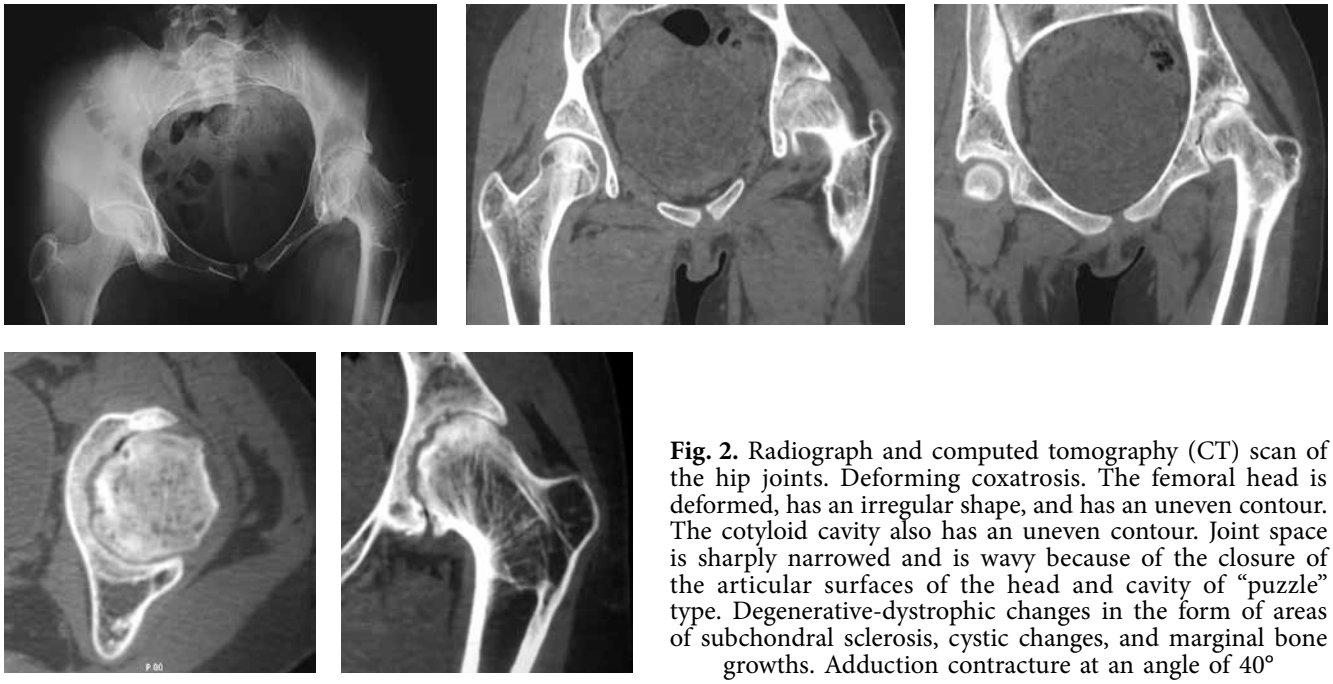

Fig. 2. Radiograph and computed tomography (CT) scan of the hip joints. Deforming coxatrosis. The femoral head is deformed, has an irregular shape, and has an uneven contour. The cotyloid cavity also has an uneven contour. Joint space is sharply narrowed and is wavy because of the closure of the articular surfaces of the head and cavity of "puzzle" type. Degenerative-dystrophic changes in the form of areas of subchondral sclerosis, cystic changes, and marginal bone growths. Adduction contracture at an angle of 40°

Fig. 3. Radiography image and patient appearance after the first stage of treatment. The distraction wire and rod apparatus is placed on the pelvis and the left hip; due to the distraction, the joint space of the left hip joint is stretched to 1.5 cm. The patient is activated in the apparatus

Fig. 4. Treatment and diagnostic arthroscopy of the hip joint: *a* — the joint cavity is absent, filled with scar tissues; *b* — after excision of scars, a joint cavity is formed

Fig. 5. The range of movements in the hip joint after arthroscopic joint lavage

lower limbs was equal. Intrarotational-adductive-flexion contracture in the left hip joint was at an angle of 15°/40°/30°, respectively. There were practically no movements in the joint, and swinging in the sagittal plane was up to 5°.

Radiography and computed tomography of the hip joints (Fig. 2) showed that on the left, the femoral head was deformed and had an irregular shape and uneven contour. The contour of the acetabulum was uneven. The joint gap was sharply narrowed and was not traced in some places. The diagnosis was a consequence of septic coxitis, secondary deforming coxatrosis on the left, and fibrous ankylosis of the left hip joint. Considering the clinical and radiological picture, the pronounced vicious position of the lower limb, the absence of pain syndrome, and early adolescence, we decided to conduct a stepwise organ-preserving complex treatment aimed at eliminating the vicious position of the limb by eliminating the fibrous block between the articular surfaces with subsequent development of movements in the hip joint. The treatment plan included a combination of the following modern methods: distraction in the device, arthroscopy, intra-articular injections, therapeutic exercises and other rehabilitation measures. The first stage (Fig. 3) for the expansion of the joint space involved the imposition of a wire-rod distraction apparatus of the MKC on the pelvic bone and the left hip with spinal adductomy.

In the postoperative period, the distraction was performed, and the joint space was expanded up to 1.5 cm. After 3 weeks, the second stage was performed; this involved the diagnosis and treatment arthroscopy of the hip joint (DTA). Arthroscopic joint lavage was performed via the anterior and lateral approaches (Fig. 4). On examination, we found that the joint cavity was absent and was filled with scar tissues of dense elastic consistency. With the use of a coblator, gradually moving deeper into the cavity, the scar tissues were dissected and removed before reaching the bottom of the cavity. After the excision of the scars, a joint cavity was formed.

On the operating table, the flexion amplitude in the hip joint reached up to 80°, and the abduction reached 40° (Fig. 5).

Fig. 6. The distraction apparatus was reassembled, and the lower limb was removed from the vicious position

Fig. 7. Passive working out of movements in the hip joint in the apparatus

The distraction apparatus was reassembled. The left lower limb was removed from the vicious position and fixed in the apparatus in a functionally advantageous position of the limb with abduction of up to 15° (Fig. 6).

In the early postoperative period, during the first 3 days, the joint cavity was lavaged with 0.25% novocaine solution. Ten days postoperatively, passive working out of movements was started. When performing therapeutic gymnastics (TG), the structure of the apparatus on the bones of the pelvis and hip was disconnected, and the hinges were removed (Fig. 7).

Fixation in the apparatus was resumed for rest periods. Fixation in the apparatus, with the preservation of extended joint space, lasted for 4 weeks following DTA. Thereafter, following the dismantling of the apparatus, a cuff extension of the lower limb was performed on the plane; furthermore, TG, positioning, massage, and physiotherapy were also performed (Fig. 8).

In addition, a course of periarticular injections of the anti-inflammatory drug and intra-articular injections of the drug based on hyaluronic acid no. 3 was administered. The patient was made to learn

Fig. 8. After apparatus dismantling, the cuff extension was continued on a plane using therapeutic gymnastics and other methods of rehabilitation

how to walk with a graduated weight-bearing protocol using the operated limb after 2 months; the Lokomat robotic complex was used (Fig. 9).

Full load on the limb is allowed after 4 months. Owing to the staged treatment, the lower limb was brought to a functionally advantageous position, and the following range of motion in the hip joint was achieved: abduction/adduction of 35°/0°/0° and flexion/extension of 70°/0°/0°. Following discharge, patient rehabilitation continued in the sanatorium, and 2 years after the treatment (Fig. 10), the gait was satisfactory and symmetrical, the left lower limb was in the middle physiological position, and the axis of the limb was correct. The spine was in the midline, and the pelvis was symmetrical. The length of the lower limbs was equal. Movements in the left hip joint were as follows: abduction/adduction of 30°/0°/0°, flexion/extension of 60°/0°/0°. There was no pain syndrome. The girl showed full social adaptation; went to school; sat at her desk; and could put on her pants, socks, and shoes independently. Two years after the treatment, the total assessment

Fig. 9. Learning to walk with graduated weight bearing on the left lower extremity on the Lokomat robotic complex

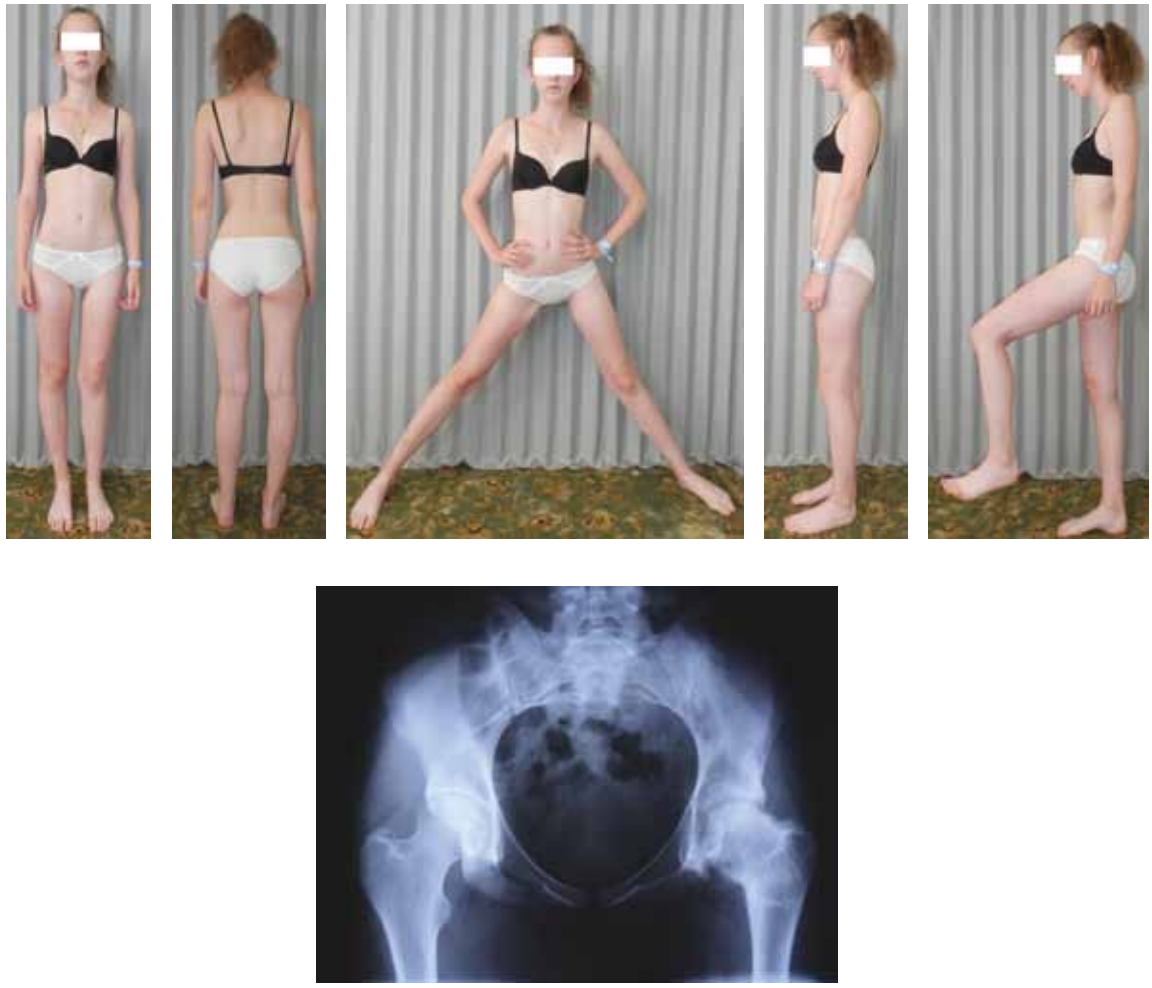

Fig. 10. Clinical and radiological results after 2 years of treatment (*described in the text*)

of the left hip joint function with the Harris Hip Score system [15] was 87.8 points (the pre-treatment score was 55.5 points). The radiographs of the hip joints show that the head of the left thigh was deformed, the contour was uneven, the joint space could be traced along the entire perimeter of the joint, and that the width of the joint space was up to 7 mm. Patient follow-up was ongoing at the time of writing this report, and we did not identify the need to replace the hip joint.

Conclusion

In this clinical case, we wanted to demonstrate that even with severe fibrous ankylosis of the hip joint in adolescents with a vicious limb position, it is possible to provide them with a good quality of life until the end of growth and complete formation of the musculoskeletal system, without performing a "desperate operation", that is, endoprosthetics of the hip joint. Such a delay can eliminate the occurrence of several problems associated with the age aspects of endoprosthetics. Thus, the use of contemporary technologies while performing reconstructive organ-sparing surgeries up to the present time is able to ensure their high relevance.

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Ethical review. Upon admission to the clinic, the patient's parents signed a voluntary informed consent to the processing and publication of personal data, participation in the study and surgical treatment.

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