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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

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**ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ
ТБИЛИСИ - НЬЮ-ЙОРК**

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3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

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3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრაფიების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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нейными фибриллами, свидетельствующий об иммунных реакциях при Covid-инфекции, чем и следует объяснить положительный эффект кортикостероидной терапии в лечении этих больных. 22 (36%) пациента из 60 госпитализированы, остальные наблюдались амбулаторно.

На основе вышеизложенного следует заключить, что даже при асимптомном течении Covid-инфекции у детей могут наблюдаться осложнения и формирование т.н. синдрома позднего Covid-a, что диктует необходимость тщательного обследования этих больных и наблюдения в динамике.

რეზიუმე

Covid-19 და ბავშვები: გართულებები და შორეული გამოსავალი

მ.ჟვანია, მ.კვეხერელი-კოპაძე, თ.კუტუბიძე, ნ.კაპანაძე, მ.გორდელაძე, ა.იაკობაშვილი, ე.ნახუცრიშვილი

თბილისის სახელმწიფო სამედიცინო უნივერსიტეტი, გ. ჟვანიას სახ. პედიატრიის აკადემიური კლინიკა, საქართველო

2019 წლის დეკემბრიდან Covid-19 მსოფლიოს მედიკოსების, მათ შორის პედიატრების, გამოწვევა გახდა. ინფიცირებულ ბავშვთა უმეტესობაში დაავადება მსუბუქი ფორმით ვლინდება, ან ხასიათდება სუბკლინიკური მიმდინარეობით. ზოგიერთ შემთხვევაში შეიძლება განვითარდეს დაავადების მოგვიანებითი მიმე კლინიკური სურათი, მულტისისტემური სინდრომის და სხვა გართულებების სახით.

თბილისის სახელმწიფო სამედიცინო უნივერსიტეტის გ. ჟვანიას სახ. აკადემიურ პედიატრიულ კლინიკაში 2020-2021 წლებში დაკვირვების ქვეშ იმყოფებოდა 60 ბავშვი, რომელთაც აღენიშნებოდათ

პოსტკოვიდური გართულებები და ე.წ. გვიანი Covid-19 სინდრომი. 60 ინფიცირებული ბავშვიდან 51 (85%) დაავადებამდე იყო ჯანმრთელი. 32 (53,3%) იყო 5 წლამდე ასაკის. ინფიცირებულ ბავშვებში დომინირებდა მამრობითი სქესი - 33 (55%). 60 პაციენტს 1,5-2 თვით ადრე მომართვამდე გადატანის დადებითი ტიტრით დადასტურდა. კლინიკურად მათ აღენიშნათ ვასკულოპათია, იმუნური თრომბოციტოპენია, რკინადეფიციტური ანემია, კოაგულოპათია, პნევმონია-ატელექტაზი, პირველადი დიაბეტი, ძირითადი დაავადების გამწვავება - ართრალგია, ართრიტი და ზოგადი სიმპტომატიკა ძილის დარღვევის, სისუსტისა და თავბრუსხვევის სახით. ცალკე უნდა აღინიშნოს მულტისისტემური ანთებითი სინდრომი 8 (13%) ბავშვში, კავასაკის დაავადების კლინიკური ნიშნებით (კან-ლორწოვან-ლიმფური კვანძების სინდრომი), პექტიური ცხელებით, პოლისეროზიტით, ჰეპატოსპლენომეგალიით, ანთების მარკერების მაღალი მაჩვენებლებით, ტენდენციით ჰიპერკოაგულაციისაკენ. ერთ პაციენტს აღენიშნა კორონარული არტერიის ანევრიზმა. 3 შემთხვევაში ANA ტიტრი მომატებული იყო 1:640-მდე, ასევე დაფიქსირდა ბირთვების ციტოპლაზმური ფლუორესცენცია ხაზოვანი ფიბრილებით, რაც Covid-ინფექციის იმუნურ რეაქციაზე მიანიშნებს და კორტიკოსტეროიდული თერაპიის ეფექტურობას ამართლებს. 60-დან 22 (36%) პაციენტი იყო ჰოსპიტალიზებული, დანარჩენი 38 იმყოფებოდა ამბულატორული მეთვალყურეობის ქვეშ.

ყოველივე ზემოთქმულიდან გამომდინარე ავტორებს გამოტანილი აქვთ დასკვნა, რომ ბავშვებში Covid-19 ინფექციის ასიმპტომური მიმდინარეობის დროსაც კი შესაძლებელია აღინიშნოს გართულებები და ე.წ. გვიანი კოვიდის სინდრომის ჩამოყალიბება, რაც ამ პაციენტების სრულყოფილ გამოკვლევასა და დინამიკაში დაკვირვების აუცილებლობას მოითხოვს.

METHODS OF TREATMENT OF LEGG - CALVÉ - PERTHES DISEASE (REVIEW)

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More than a century has passed and the problem of treating Legg-Calvé-Perthes Disease (LCPD) remains relevant. Children between the ages of 2 and 12 tend to get sick. Formation and progression causes a violation of blood supply to the femoral head over time. Subsequently, this leads to changes in the femoral head, metaphysis, epiphyseal plate, and coxal cavity [32]. The flaccidity of the femur epiphysis is deformed during load and leads to deformation of the femoral head due to uneven load transmission [35].

Elimination of pain and symptoms, restoration of the range of movement of the hip, and the retention of the femoral head in the coxal cavity are the targets of the treatment [55].

Dissatisfaction with the results of treatment has led to the existence of many conservative and prompt treatments [12,18,23,26]

Purpose of review - to review the various existing methods of conservative and operative therapies of LCPD, which include the elimination of pain and symptoms, the restoration of the range of hip movements, and the retention of the femoral head in the coxal cavity.

Material and methods. Literature search was conducted through PubMed and Google Scholar using keywords Legg - Calvé - Perthes Disease, Perthes disease; operative therapy, conservative therapy, childhood hip disorder. 5921 publications were initially identified. Articles were published between December 1971 and August 2020.

Result and discussion. Treatment of Legg-Calve-Perthes disease is not lost in relevance in time and presents serious problems, due to long rehabilitation and a large percentage of unsatisfactory outcomes, despite the existence of various successful treatments. That promotes the search for more rational approaches to the therapy and perfect surgical interventions. There are two great areas for LCPD therapy: conservative and surgical.

1. Conservative therapy. The conservative therapy is divided into three main areas:

1. Unloading the joint and immobilization of the limb for a very long time.
2. Orthoses and application of a plaster bandage to immerse the femoral head into the coxal cavity.

Improving blood supply or increasing the strength of the femoral head - physiotherapy, balneotherapy, hyperbaric oxygenation, the use of glycosaminoglycans and bisphosphonates, plasma therapy, platelets enriched, epidural analgesia, complex conservative therapy, etc [48].

1.1. Terms of conservative therapy

According to Wiig et al. non-surgical treatment is provided to children under the age of 6 or in case of lesion of the A lateral pillar [71].

The determining points for conservative therapy are the age of the patient and the stage of the disease - the group I and partly the II according to the classifications Catterall, Salter & Thompson [17].

The state of full "immersion" of the femoral head into the coxal cavity stops the progression of deformation of the head and prevents the development of subluxation, as well as helps to correct the deformation [15]. In order to unload the joint for a long time, until reaching maturity of bone tissue, used - orthopedic unloading corsets, plaster bandages, stretching cuff or adhesive and other methods [7,10,67].

In herring studies and co-authors in 2004, they examined the results of treatment of about 400 patients over the age of 6 with LCPD, using 5 types of therapy. According to the results, there is no statistically significant difference between therapeutic gymnastics and observation, plaster bandage or braces. The unsatisfactory outcome reached 20 %, according to the Stulberg classification. According to P.G. Petrie, I. Bitenca & B. Curtis, they have demonstrated excellent results using of plaster bandages and orthoses, the negative result was only in 9-17 % of cases [11].

Different methods of conservative therapy are effective in the early stages, with a slight lesion of the segment. In case of extensive damage to the femoral head, as well as in the contracture of a hip joint, it is necessary to use another treatment [4].

1.1. Methods based on the principles of improving blood supply or increasing the strength of the femoral head

1.0.1. Bisphosphonates

Bisphosphonates are known to be inhibitors of osteoclast resorption of the bone tissue. There are data from experimental studies, which say that bisphosphonates reduce bone resorption and deformation of the head. But the distribution of bisphosphonates depends on the blood supply and their influence is limited accordingly [37]. In an experimental study on animals, the anatomical structure of the femoral head was observed and the expressed decrease of osteoclasts [36]. Bisphosphonates are achieved not only inhibiting the process of osteoclast resorption, but also accelerating osteoblast activity [35].

1.0.2. Acupuncture

There is a description of clinical case T. Set, in the absence of the effect of brace treatment in a 12-year-old boy, 196 sessions

of classical and laser acupuncture were received over a period of 4 years. After 2 years of acupuncture according to X-ray data, the recovery was 90%. After 6 years, there was a complete restoration of the anatomical structure of the femoral head [62].

1.0.3. Antioxidants

Lobashov V.V. cites an approximate successful complex treatment with antioxidants (mexidol). During the studies, 26 children had received antioxidant therapy (intramuscular, ointment form, intraosseous injections). A positive result was achieved in 84.6 % of cases and unsatisfactory 15.4% [48].

1.0.4. Epidural analgesia

Prolonged epidural analgesia in Legg-Calvé-Perthes Disease improves the local tissue trophics, helping to eliminate spasms in ischemia, reducing pain syndrome. There was also a slowdown in the flow of aseptic necrosis. The method allowed to delay total hip replacement for up to 6 years-old-age [2,3].

1.0.5. Physiotherapy

In the complex treatment of the Legg-Calvé-Perthes disease, intralesional electrophoresis of proteolytic enzymes was proposed. The author believed that these manipulations reduce increased intraosseous pressure, help to germinate the additional feeding vessels, and together with grafts stimulate bone regeneration in the head of the hip [56].

In studies comparing different treatments, physiotherapy has been applied for children with mild disease. There were the following patient characteristics: children with hip necrosis were less than 50% (Catterall Group 1 or 2). As well as children under six years old with necrosis of the femoral head were more than 50%, who have a good coating of the femoral head (>80%) [20].

For patients with a light course, physiotherapy can improve joint range, muscle strength and joint dysfunction. The physiotherapy treatment included: 1) passive mobilization for stretching the muscles of the affected hip; 2) exercises with lifting straight legs to strengthen the muscles of the hip, participating in bending, flexing, lifting, and engaging the thigh muscles. They started with isometric exercises, and after eight sessions - isotonic exercises. Balance training is first on a stable terrain and then on unstable.

There are scientifically sound recommendations for postoperative LCPD treatment in children between the ages of 3 and 12 years and evidence-based recommendations for conservative LCPD treatment in children between the ages of 3 and 12. These studies are largely based on the "local consensus" of LCPD team members from Cincinnati Children's Hospital Medical Center. These recommendations provide evidence on the methods of physiotherapy, postoperative and conservative management. Recommendations are offered: exercises to improve balance and gait and intervention to reduce pain.

Children with LCPD should avoid hip overload. Gait training to unload the hip can be an integral component of conservative treatment for children with LCPD.

Non-surgical corset treatment is a reliable alternative to surgical treatment of LCPD between the ages of 6 and 8. However, they could not have known whether the good results were due to the corset or the result of a good prognosis for these patients [20,58].

1. Operative therapy

The history of operative therapy for ischemic necrosis of the femur head has passed several stages. In the beginning, palliative methods of operative therapy were used to stimulate reparative processes in the epiphys area of the femur. The method of tunneling, drilling of the femur head and its neck by Beck has become widespread [31].

Assuming in the future possible early development of osteoarthritis, many orthopedists recognize the benefits of more active, operative tactics to treat this disease [11,40,54,68,70]

In case of violation of anatomical ratios at the stage of exodus, reconstructive operations are carried out.

Operative therapy of Legg-Calvé-Perthes Disease is carried out with an unfavorable prognosis in order to improve the volume of movements in the joint, restore limb length, cupping pain syndrome [16, 70].

The long-term results of operating interventions are more than modest. In the evaluation of 59 patients operated between 1959 and 1974, in 2002 36 % of patients had osteoarthritis, and in 2010 – 50 % of patients only [61].

In 2012, Nhu-An has compared the results of conservative and operative therapies of patients. The meta-analysis showed that operative therapy was more likely to contribute to the formation of a spherical congruent femur head than conservative treatment in patients of 6-years-old age and older. The patients younger than 6 years-old age the results of operative and conservative therapy were identical [55]. Positive results to restore the anatomical spherical shape of the femoral head are dependent on age: the younger the child at the time of the disease, the more effective the therapy is [69].

In Kim HK research, Su PH. the outcomes of Legg-Calvé-Perthes Disease were studied in 66 patients with an average follow-up period of 20. 4 years (16. 3 to 24. 5 years). The most common complaints in patients were pain syndrome, developing arthrosis and ongoing hip dysfunction. Total arthroplasty was performed by 3 patients and 1 patient carried out pelvic osteotomy. 24 patients suffered from severe osteoarthritis. Only 14 patients had no signs of osteoarthritis [38].

Endoprosthesis replacement at an early age in patients with LCPD contributes to lower survival rates, according to the study [34].

A number of authors propose a combination of operative and conservative therapies for LCPD [50].

2.1. Femoral or pelvis osteotomy

Femoral or pelvis osteotomy is indicated in children over 8 years of age. Femoral varus osteotomy and anonymous Salter-type osteotomy give good results. However, in severe forms, it is preferable to combine these two methods or perform a triple pelvic osteotomy. Surgery is now much less common than before, as it is only effective in patients with the disease of lateral support of group B or B/C with the onset after the age of eight. In other situations, therapeutic abstinence is recommended [47].

The main task of osteotomy is to ensure the centering of the femoral head and congruence of joint surfaces, recently osteotomy has become one of the common operative methods. The optimal time to perform a femoral dethrosy-varisizing osteotomy is considered to be the stage of avascular necrosis or the initial period of the fragmentation stage [14, 29]. Many authors advocate inter-reversive correctional femoral osteotomy [19, 41, 44, 53, 57].

In the stage of the exodus of Legg-Calvé-Perthes Disease with an expressed shortening of the limb and hypertrophy of the greater trochanter developed femoral rotation-longing interverent osteotomy [16, 15, 28]. Salter-type surgery has led to the possibility of improving the congruence of joint surfaces with existing changes in angular parameters, as well as a significant improvement in the blood supply to the joint compared to other types of osteotomy. The pelvic component was corrected with various types of pelvic osteotomy in combination or without interference with the proximal part of the femur [59, 60, 58]

There are surgical interventions in the form of acetabuloplasty, supplemented, if applied, by interverent osteotomy. In most cases, orthopedists prefer to use Salter-type pelvic osteotomy and modifications of triple pelvic osteotomy such as Steel, Tonnis, Chiari, rotational acetabular osteotomy, Ganz, Bernese. This group of surgical interventions has a number of advantages: the necrosis center avoids load, there is reliable fixation of bone fragments, restoration of biomechanical beneficial relationships of joint surfaces, reduction of the period of postoperative rehabilitation [13,47].

Kyung Soon Park et al. speaks of the successful use of modified Salter-type osteotomy, produced in 30 cases with satisfactory long-term clinical and radiological re-examinations [42].

Asep Santoso et al. gives examples of the results of successful treatment of osteotomy dometatosis of the pelvis combined with trochanteric advancement for sequelae of Perthes' disease. Good results of treatment of acetabular dysplasia due to Perthes disease were obtained in the middle or long-term period. Pain relief was received in 13 out of 14 (92.8%) patients in the post-operative period. From good to excellent functionality, the result was obtained from 10 out of 14 (71.4%) patients. The average score on the Harris scale improved from 63 to 84 ($p < 0.05$) in the last phase of the observation. Improvements in lame gait were observed in 10 out of 14 (71.4%) patients [5].

Yi cites the results of the use of Bernese-type triple pelvic osteotomy with a modified Smith-Peterson anterior approach, which combines periacetabular and triple osteotomy. The author believes that this technique is an alternative method of treatment in the elderly people. Not only does it provide a large correction of the coxal cavity, but it also provides good biomechanical stability [75].

Negative outcome with the development of deforming osteoarthritis, with the right selected and carried out operational treatment, reaches 20%. That requires a subsequent complete joint replacement [2]. Surgical treatment in the form of femoral osteotomy is a factor complicating subsequent hip replacement. It is known from the statistics that bilateral form occurs in 10-20 % of cases, which also makes it difficult to carry out operative therapy while maintaining the patient's mobility [44]. On the other hand, the difficulty of choosing a conservative treatment method causes a positive outcome of the disease in 30-50% of cases, with the restoration of the spherical head of the femur, without significant statistical differences of the chosen method [27].

J. Lehman et al. speak about the successful use of arthroplasty in the treatment of Legga-Calvé-Perthes disease [46]. Luo and co-author cite the assessment of 10-year results in uncemented monoblock total arthroplasty of the hip 71 patients (88 hip joints) were examined. The data suggest that the trunk of the monoblock can lead to satisfactory results - the restoration of clinical function, the improvement of X-ray evaluation, the restoration of normal limb length, reduction of complications and increased survival among patients [76].

As the healing potential decreases with age, patients with LCPD should receive treatment corresponding to their age group. Conservative treatment is usually applied to patients under 6.0 years-old of age from the beginning, and surgical treatment is recommended for those over 8.0 years of age, but it remains unclear what is best for patients between the ages of 6.0 and 8.0 years. The purpose of this retrospective study was to compare the results of Salter-type osteotomy and conservative therapy in this age group. As a result, there was no significant difference in hip pain and joint mobility between groups in this age group [33].

The long-term results of The Chiari-type osteotomy in Legg-Calve-Perthes disease in children with Catterall III or IV type have also been studied. Chiari-type osteotomy with 15 degrees for Legg-Calve-Perthes disease in children with Catterall III or IV type can effectively lower the index of the coxal cavity and can help to change the shape of the femur and then further improve the clinical effects [77].

2.2. Valgus or regimented osteotomy

Improves the spinal mechanism of a teenager's hip with the effects of Perthes' disease. Proper surgery, when the hip is still in the pre-arytritic stage, restores function and protects the young hip from early degenerative changes.

Eid cites the results of treatment of 12 adolescents with a combined intra-articular/injected impinge due to the effects of Perthes disease in the form of coxamagna was carried out osteochondroplasty at the junction of the femoral head and cervix and the relative lengthening of the femoral cervix by the spiritual transfer of a large twithlet, coxaplana, coxabrevis, with the predominantly large vernea. In all cases, safe surgical access to a dislocated hip was performed. Removal of the narrow arc of pathological load due to the impingement is the main advantage of the proposed surgical technique. Other benefits include increased leverage and the restoration of hip motion range with normalization of load conditions, and therefore the future development of degenerative arthritis and the expected need for future joint replacement surgery can be prevented or delayed. Vascularization of the femur head is well supported thanks to the proven safety of the surgical access presented [24].

Osteostimulative interventions in the form of multiple tunnelization of the femoral head and cervix with the introduction of allografts were performed in patients with X-ray indicators of the hip joint close to the age norm. Over time, the operative intervention was improved in the form of transplantation on the nourishing vascular-muscular leg in the upper acetabular area [22].

There was a low efficiency of tunnelization of the head of the femur with the introduction of surgery transplants, in view of the absence of trophies of free bone grafts vascularization was ensured and often observed progression of the disease [63].

Decompressive operations are becoming popular, providing a hip discharge, reducing intraarticular pressure, weakening muscle contractures and reducing the load on the affected femoral head. To this end the following were applied: the tenotomy of the iliac-lum, leading and subspinal muscles, cross-cutting in several places of the wide fascia of the hip followed by adhesive or skeletal extremity of the limb. Since 1993, external fixation devices such as G.A. have been used to unload the hip joint Ilizarov [65]. In 1965 Axer A. proposed varizing detorsion osteotomy as an alternative method in the treatment of Legg-Calve-Perthes disease [8].

In order to unload the most damaged quadrant of the head, a method of inter-flexion-warising femoral osteotomy is developed and introduced into clinical practice, in which, unlike deprofessionalizing, another element is performed - the flexion of the proximal part of the femur. In the development of the surgical intervention Bernbeck R's operation was taken as the basis, the main principle of which is to change the angle of the slope of the fragments of the obliquely sawed cylinder when they rotate on the axis, perpendicular plane of the section [52]. On the basis of this principle, a method of intervening oblique osteotomy of the femur has been developed, allowing to achieve a multi-axis simultaneous correction of the proximal end of the femur [39].

Leclerc at al. it was concluded that the best effect was achieved by putting the lower limb 30 degrees in the outside and limiting

the stretch time to no more than two weeks, otherwise prolonged stretching contributes to a negative effect [45].

Long-term observations showed that varus osteotomy of the femur was an effective treatment for patients with Perthes disease between the ages of 6 and 8 with Herring B and C hip lesion at the onset of the disease. Hip congruence was obtained by femoral varus osteotomy, and closed wedge osteotomy gave more favorable results to CE angle [6].

Barakat et al. offers a closed repository in older children an effective and reproducible method of treatment in the hands of an experienced pediatric orthopedic surgeon, subject to careful observation and careful study of possible complications and their treatment, including the possibility of a timely transition to an open reposition [9].

For children over 6 years-old age diagnosed with femoral head necrosis, more than 50% proximal varus osteotomy has produced significantly better results than orthoses and physiotherapy [72].

2.3. Hip arthroscopy

New treatments for mechanical symptoms and/or femoral acetabular impingement have emerged. Arthroscopic treatment of the effects of LCPD eased pain symptoms and improved the range of motion, making arthroscopic treatment a good option for treating the effects of LCPD [73].

Kanatli in his study demonstrates improvements in functional outcomes and quality of life for patients who have undergone hip arthroscopy due to LCPD. It is believed that hip arthroscopy, a minimally invasive procedure, may play an important role in the LCPD treatment algorithm, especially in patients with severe pain and mechanical symptoms [66].

Hip arthroscopy was performed to 19 children with Legg-Calve-Perthes disease in the Shigeo Suzuki et al. As a result, the growth of the synovial shell was expressed both in the swivel pit and over the inner wall of the capsule. Hypervascularization of the twirling lip was observed at all stages of the disease. Microscopic hyperplasia of synovial lining cells was observed, but inflammatory changes in synovial tissue were invisible in the early stages of the disease. Although endothelial vascular cell hypertrophy was observed at the late stage of the disease, it was not distinct at the initial stage or stage of fragmentation. Joint pain decreased after irrigation during arthroscopy [64].

Freeman et al. presented the results of the arthroscopy of Legg-Calve-Perthes disease and reflected that it played an important role in the treatment of painful consequences. It is often possible to expect successful results with minimal morbidity. Reducing symptoms and improving quality of life are reasonable expectations, although these data do not suggest that hip arthroscopy alters the natural history of the disease [25].

Hip arthroscopy is a safe procedure even for patients with an immature skeleton. It turns out to be effective for improving functional disorders caused between the deformed head of the femur and the coxal cavity, or some intraarticular focal problems in hip diseases in children and adolescents. However, this does not mean that hip arthroscopy can prevent or delay the development of osteoarthritis [21].

2.4. Arthrodiastase of the hip joint

What can be done with regard to indications of the use of arthrodiastase in the active stage with the late onset of Perthes disease or as a rescue procedure in later cases with debilitating deformity. There is insufficient evidence to suggest whether it is superior to other interventions and may be combined with hip or pelvis osteotomy as stage 2 surgery. More randomized control is needed to be tested to compare with other treatments [74].

Carlos Augusto Malheiros Luzo and co-authors presented preliminary results of treatment of patients with Legga-Calve-Perthes disease using hip monolateral external fixer applied to the hip for 18 patients. Among the patients were 13 men and 5 women, the average age is 8.5, from 5 to 13 years-old. All patients had one-sided hip damage: nine on the right and nine on the left. The results were evaluated in adulthood using clinical and radiological criteria. Results: all patients improved joint mobility, pain relief was achieved in 88.9% of cases. The reossification of the epiphys of the femur occurred during the first three months of treatment. The hips operated on at the stage of necrosis of the disease did not pass the stage of fragmentation, which led to a reduction in the period of the disease. The results were 77.8% satisfactory and 22.2% unsatisfactory improved joint mobility. The use of arthrodiastase technique at the stage of necrosis or at the stage of fragmentation (active phase of the disease) gave satisfactory results from treatment. Arthrodiastase of the hip joint with the use of a one-sided external retainer in the active stages of the disease improves joint mobility. The use of arthrodiastase technique at the stages of necrosis and fragmentation (active stages of the disease) gives satisfactory results in the treatment of the disease [49]. Maxwell and co-author investigated the effect of arthrodiastase on the preservation of the head of the femur in older children with Perthes disease. Arthrodiastase was used for about four months. The initial criterion for evaluation was the degree of epiphysal collapse at the end of the fragmentation phase. One of the 15 treated hips and nine of the 30 control hips showed a loss of height of 50% or more lateral epiphysal column on the front of the X-ray (Herring classification). From Lauenstein's point of view, one of the treated thighs and 19 control thighs showed a loss of height of at least 50 % of the anterior epiphysal column. Complications of arthrodiastase included a pin infection in most hip joints, temporary joint stiffness in two and a broken finger on two. The final result will be known when all patients and the control group reach the maturity of the skeleton [51].

Arthrodiastase is a minimally invasive technique useful in the treatment of late-onset Perthes disease. When applied early, it improves clinical outcomes and retains the shape of the head. However, it is not free of complications that can occur in 8 out of 10 patients treated with this technique [1].

Arthrodiastase, hinge or fixed using an external ring retainer in combination with the lead muscle tenotomy, is an excellent and reliable treatment for Perthes disease with late onset, when the prognosis is usually poor and traditional treatments are unreliable [30].

Arthrodiastase of the hip joint with the release of soft tissues can make a good contribution to the treatment of Legg-Calve-Perthes disease. This method of treatment has many advantages, such as simplicity of technique, minimal frequency of complications, short period of hospitalization, correction of shortening because it increases the length of the limb, and a higher level of acceptable results than would be expected compared to other methods. Reduces upper and lateral sub-raving and provides better X-ray spherical sphericity of the head of the femur. In addition, it does not distort the anatomy of the pelvis or the proximal part of the femur; it can also be used in older children who usually have poor prognosis. Distraction treatment is not limited to hip stiffness, femur or sub-infection, and can be used when other treatments are not suitable [43].

Conclusion. When choosing a treatment method for Legg-Calve-Perthes disease, it is necessary to focus on the specific clinical case. As well as take into account the age of the patient

at the time of the beginning of the pathological process, the stage of the disease, the size and location of the lesion in the head of the femur, predictive anatomical and functional factors.

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SUMMARY

METHODS OF TREATMENT OF LEGG-CALVÉ-PERTHES DISEASE (REVIEW)

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This Literature Review presents various treatments, including operative and conservative therapies, of Legg - Calvé - Perthes Disease. The problem is relevant because of the prevalence of the disease. The authors presented a review of literature, which managed to classify the main methods of treatment by the principles of action, practical application, and presented the interpretation of the effectiveness of modern research from the point of view of evidence-based medicine.

Keywords: Legg-Calvé-Perthes disease; Perthes disease; operative therapy; conservative therapy; childhood hip disorder.

РЕЗЮМЕ

МЕТОДЫ ЛЕЧЕНИЯ БОЛЕЗНИ ЛЕГГА-КАЛЬВЕ-ПЕРТЕСА (ОБЗОР)

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В литературном обзоре проанализированы различные методы лечения (оперативные, консервативные) болезни Легга —

Кальве — Пертеса. Проблема актуальна ввиду распространенности заболевания. На основании анализа и синтеза текущей и ретроспективной научной литературы авторами рассмотрены

и классифицированы основные методы лечения по принципам действия, практическому применению, а также дана оценка эффективности с точки зрения доказательной медицины.

რეზიუმე

ლევა-კალვე-პერტესის დაავადების მკურნალობის მეთოდები (მიმოხილვა)

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²ასტანის სამედიცინო უნივერსიტეტი, პედიატრიული ქირურგიის კათედრა, ნურ-სულთან,
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სამედიცინო-პრაქტიკული ცენტრი, მინსკი, ბელორუსია

ლიტერატურის მიმოხილვაში გაანალიზებულია თანამედროვე და რეტროსპექტიული სამედიცინო ლიტერატურა ლევა-კალვე-პერტესის დაავადების სამკურნალო მეთოდების შესახებ. განხილულია მკურნალობის ოპერაციული და კონსერვატი-

ული მეთოდები, რომლებიც კლასიფიცირებულია მკურნალობის, მოქმედების პრინციპების და პრაქტიკული გამოყენების გათვალისწინებით. განხილულია მასალის ანალიზის და სინთეზის შედეგად ავტორებს მოცემული აქვთ მეთოდების ეფექტურობის შეფასება.

STRESS-AFFECTED Akt/mTOR PATHWAY UPREGULATED BY LONG-TERM CREATINE INTRAPERITONEAL ADMINISTRATION

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Oxidative stress is known to be characterized by significant alterations in metabolic processes, namely changes in the hormonal status, decreased energy metabolism and antioxidant status, as well as quantitative changes in enzyme activity and signalling molecules, which, in turn, affect transcription and translation processes [20,24]. Several compounds can prevent these processes. Among them is the Creatine (Cr; α -N-methylguanidinoacetic acid), which can be found in almost all mammals. It is primarily concentrated in muscle and brain. It participates in the Cr/CK/PCr system, is actively involved in energy metabolism, and its deficiency is associated with a decline in many physical and cognitive functions [2,9,13]. It is believed that the primary mechanism of action of Creatine (Cr) is its participation in the energy storage processes. Besides, various experiments also confirmed its neuromodulatory and neuroprotective properties [4,17]. Cr synthesized in nerve cells functions as a signalling molecule. In particular, it can activate some signalling pathways and, in this way, regulate energy metabolism, influencing growth, proliferation and viability of the cell [1,14]. In the brain, Creatine is most concentrated in the regions associated with learning processes and memory (such as Hippocampus, Pyramidal neurons of the cortex, Purkinje cells of the cerebellum). It is assumed that these areas are also marked with high ATP metabolism [21].

Cr is not only established to be synthesized by neurons, but it is also suggested to be delivered peripherally through the blood-brain barrier [2,4]. Exogenous Cr showed its neuroprotective properties in the number of neurological diseases such as Parkinson's disease, Huntington's disease, Amyotrophic lateral

sclerosis (ALS), head injuries [3]. Quantitative changes in Cr have also been shown in various psychiatric disorders, such as depression [1,5].

Recent data have further revealed the antioxidant properties of Cr [14,29]. Observations have shown that lipid peroxidation processes are down-regulated as antioxidant enzymes are activated in muscle and central nervous system (CNS), during Cr supplementation [14]. Such alterations might be caused by several stressors, such as long-term violation of natural circadian rhythm [26]. This kind of stress is usually accompanied by a change in antioxidant and energy metabolism - resulting in ATP deficiency, the brain's energy potential and functional deterioration, cell viability reduction, stimulation of pro-apoptotic processes, and variation in ion content [32].

Considering the above mentioned, the purpose of our investigation was to study complications in energy metabolism in the hippocampus under stress caused by long-term disturbance of circadian rhythm and the preventive action of Cr administered exogenously.

Material and method. Experiments were conducted on 200–250 gr male Wistar rats. The animals were divided into three main groups before the experiment:

- (1) G1 – control group – was kept in a common cage under natural conditions (dark/light ratio = 10/14);
- (2) G2 – stressed group – individuals were maintained in individual cages in the darkness (dark/light ratio = 23.5/0.5) for 30 days;
- (3) G3 – Cr-treated stressed - individuals were maintained in individual cages in the dark (dark/light ratio = 23.5/0.5) for 30