

Efficacy and Safety of Transurethral Ureterolithotripsy in Children

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Abstract: Objective: To study the effectiveness and frequency of intraoperative complications of transurethral ureterolithotripsy (TUULT) in children with ureteral stones. Materials and methods: for the period from 2018 to 2022, transurethral ureterolithotripsy was performed in 253 children, whose average age was 9.8 ± 4.1 years. The average stone size was 10.2 ± 0.1 mm. Stones were located in the distal part in 76 (30.1%) cases, in the middle part in 70 (27.6%) children, and in the proximal part of the ureter in 107 (42.3%) patients.

Results: the stone free indicator was 92.1%. Intraoperative complications were observed in 7.9% of cases. Ureteral perforation was observed in 4 (1.4%) cases, and conversion to traditional intervention was observed in 2 (0.6%) children.

Conclusions: TUULT is an effective and safe method of removing stones from the ureter, regardless of the location of the stone.

Keywords: ureteral stones, ureterolithotripsy, children.

Urolithiasis (urolithiasis) is less common in children than in adults, however, the frequency of detection of this pathology increases every year (1). Moreover, in the presence of stones in the urinary tract, kidney damage in children is more significant due to the characteristics of the body and often causes kidney failure. In addition, in children, after removal of stones from the urinary tract, a relapse of the pathology is detected in 50% of cases [2, 3]. In particular, during the period from 1987 to 2000, the frequency of detection of calculi in the upper urinary tract in children increased, whereas previously stones located in the bladder prevailed [2]. Therefore, the use of effective and safe methods of surgical treatment of urolithiasis in children is relevant.

Improvements in the instruments used for minimally invasive interventions, such as ureteroscopes, have allowed us to consider the possibility of using them in the treatment of children with ureteral stones. Moreover, the improvement of the optical system, additional equipment for fragmentation and stone removal has led to the fact that endoscopic methods are the method of choice in many cases in the treatment of ICD in pediatric urology. It should be noted that ureteroscopy is now more widely used since the first publication of the results of using this method in pediatric practice, which was made in 1988 Ritcheyby Ritchey et al. (4).

However, many urologists believe that endoscopic treatment is a complex operation and, therefore, should be a backup option for stone removal in exceptional cases. While the first line of treatment in children should be considered extracorporeal shock wave lithotripsy (ESWL). However, in recent years, the opinion of urologists has changed due to the fact that the effectiveness of remote lithotripsy has not been very high and repeated intervention sessions are often necessary to completely get rid of urinary tract stones [3,5]. Moreover, the disadvantages of ESWL are the need to use radioscopy to determine the localization of stones and the inability

to sufficiently concentrate the energy of the shock wave in children of a younger age group, since the devices used are intended for adult patients.

Despite the fact that the frequency of using ureterolithorpsy in children has increased, the indications for using this method, the results regarding the indicator of complete absence of stones and the frequency of complications of this intervention remain unclear. It is believed that the endoscopic method should be used in children with a stone size of more than four millimeters. In particular, there is currently no consensus on the size of the fragment after lithotripsy, which should be considered as clinically insignificant. Thus, fragments of stones with a size of three mm or less in adult practice are often considered insignificant, since in children, due to the anatomical and physiological features of the urinary tract, larger concretions can independently depart.

The purpose of the study.

To study the effectiveness and frequency of intraoperative complications of transurethral ureterolithotripsy (TULT) in children with ureteral stones.

Materials and methods.

For the period from 2018 to 2022, transurethral ureterolithotripsy was used for stones located in the uretery in 253 children, whose average age was 9.8 ± 4.1 years (range from 4 to 18 years). There were 178 (70.4%) boys and 75 (29.6%) girls among them. Stones were found in the left ureter in 146 (57.7%) patients and were located in the right ureter in 107 (42.3%) patients. The location of stones in the supravescical part of the urinary tract and their size are shown in Table 1.

Surgical intervention was performed under general anesthesia, in the position of the child on his back. Before ureteroscopy, to ensure the safety of manipulation, a flexible guide was inserted into the ureteral lumen, the tip of which was located proximal to the stone or in the calico-pelvic system of the kidney. Ureteroscopy was performed with an 8 Ch (Storz) rigid endoscope. Dilation of the ureter's mouth was not used, and the stones were fragmented using a pneumatic lithotripter or laser. Most of the fragments were removed using tweezers, and if there were fragments of less than 4 mm, the operation was completed. An internal ureteral stent was installed for intraoperative complications or pathological changes in the ureteral mucosa.

The duration of surgical intervention was 62.8 ± 19.3 minutes (range from 30 to 110 minutes). A pneumatic lithotripter was used for stone fragmentation in 120 (47.4%) cases, and a laser was used in 133 (52.5%) cases. Ureteral stents were installed in the postoperative period in 13 (5.1%) patients, and in four cases due to damage to the ureteral wall and intraoperatively detected extravasation, in the other two - due to ureteral edema in the area of the stone location. Stones (and their fragments) were completely removed in 233 (92.1%) cases using a single TULT. Moreover, in 12 cases, residual stones of no more than 4 mm in size receded after litholytic therapy.

Transposition of the stone from the ureter to the lumen of the calico-pelvic system with retrograde access occurred in 6 (2.4%) cases and the stone was removed using percutaneous access to the kidney cavity. Due to the deviation of the ureter located in the middle third during retrograde endoscope insertion, it was not possible to visualize the stone in 5 (1.9%) children, the stone was removed using antegrade access. Conversion of endoscopic surgery to traditional surgery was observed in two cases (0.6%). In one case, ureterolithotomy was performed due to the fact that the stone was more than 10 mm in size, tightly bound to the ureteral mucosa, and there was a relative narrowing distal to its location that did not allow the endoscope tube to be carried out. Ureterocystoanastomosis was performed in a different case (with stone removal) due to stricture of the ureterovesical anastomosis.

Discussion.

Over the past decades, urologists have revised their views on the treatment of children with urolithiasis, in connection with which the number of cases where ureteroscopy was used to rid patients of stones located in the ureter has increased. The reason for this situation was the miniaturization of endoscopic instruments. Utangac M. M. et al. He reported using ureterosкопа small-diameter ureteroscope (4.5 Ch) for retrograde removal of stones up to 10.5 mm in children (5). However, the authors used this tool to remove stones located in the distal ureter. We used ureterosкопа large-caliber ureteroscope with an 8-Ch tube, which allowed us to access stones in any part of the ureter and remove them. Only in 5 (1.9%) cases, the antegrade method of ureteroscopy was used due to a pronounced deviation of the ureter антеградный способ уретероскопии. Moreover, we did not perform ureteral mouth augmentation with special instruments, and therefore the need for installing an internal ureteral stent was less.

According to various authors, children with a single ureteroscopy intervention can get rid of ureteral stones from up to 77% to 100% of cases (6). According to our data, the stone free state was in 92.1% of cases, if we do not take into account the presence of stone fragments at the end of lithotripsy with dimensions less than 4 mm, which after surgery independently they left without any complications. Moreover, the use of a laser allows the stone to be fragmented into very small parts that can not be removed from the ureteral lumen (6). However, the use of a laser significantly extends the duration of the operation. According to our data, the duration of surgical intervention in the group of children who used a pneumatic lithotripter was on average 69.8 ± 12.3 minutes, whereas when using a laser, it was 40.3 ± 12.3 minutes ($p < 0.05$).

Many urologists believed that drainage of the supravvesical part of the urinary tract is a prerequisite for TULT in children, but this postulate has been revised in recent years. The reason for this situation is several factors. Firstly, the presence or absence of an internal ureteral stent does not affect the frequency of complications, secondly, it causes discomfort ("stenting syndrome", imperative urination, pain in the lumbar region), and thirdly, anesthesia should be used to remove the stent in children. So Mokhless I. et al. only 14.2% of patients underwent ureteroscopy for a ureteral stone and had a ureteral stent installed (8). As a rule, the stent was installed in cases of edema of the ureteral mucosa and large stone sizes. We established the internal ureteral wall at 13 (5.1%) due to the presence of ureteral deviation or damage to its wall during lithotripsy and bleeding.

Intraoperative complications of ureteroscopy in children are rarely observed, as a rule, they are associated with technical difficulties when conducting an endoscope through the ureter, not so much the energy used for stone fragmentation. According to Nunes-Carneiro D. et al. et al. the total number of intraoperative complications was 8.3%, including ureteral perforation with extravasation of urine in 4.7% of cases and stone migration into the kidney cavity in 5% of patients, conversion of endoscopic intervention to open surgery was performed in 0.5% of patients with terminal ureteral stricture [9]. There are several risk factors that can be the cause of complications of TUULT, which include patients before school age, stones located in the proximal part of the ureter and larger than 15 mm. According to our data, the total number of intraoperative complications was 7.9%. Moreover, in 2.8% of cases, the calculus was transposed from the ureter into the kidney cavity, and 1.5% of patients had ureteral damage. Conversion of ureteroscopy to traditional intervention was 0.8% of cases. Due to the "ingrown" stone in the ureteral mucosa, it was not possible to fragment it and a ureterolithotomy was performed. Ureterocystoanastomosis, with the removal of the stone, is formed in another child due to the presence of stricture in the lower ureter. Many urologists believe that to reduce the frequency of intraoperative complications before ureteroscopy, it is mandatory to install a flexible conductor in the ureteral lumen, to visualize its lumen and preserve the already created access. According to our data, it was possible to insert the guide into the ureter and place its distal end in the kidney cavity in 242 (4.3%) cases. It should be noted that this procedure was unsuccessful in patients with complications.

The most common complication after TUULT is an exacerbation of pyelonephritis, accompanied by hyperthermia. According to some authors, the incidence of hyperthermia ranges from 2% to 12.5%, despite the absence of urinary tract infection and the antibiotic therapy received before the intervention (4,5). Therefore, many urologists question the need to use antibiotics before ureteroscopy. According to our data, exacerbation of pyelonephritis occurred in 13.6% of cases, however, we performed urinary tract sanitization in preparation for TUULT and continued antibacterial therapy after the intervention.

Conclusions.

1. TUULT is an effective and safe method of removing stones from the ureter, regardless of the location of the stone and the age of the patient. At the same time, the indications for intervention should be carefully determined, taking into account the size of the calculus.
2. Before performing ureteroscopy, it is necessary to install a flexible guide in the ureter, which facilitates visualization of its lumen and reduces the likelihood of intraoperative complications.
3. The installation of an internal ureteral stent is advisable to use in case of complications that have occurred when performing TULT, such as perforation of the ureteral wall or bleeding.

Literature.

1. Nutfilloevna A. D. Modern Approaches to Allergen-Specific Diagnostics in Children with Allergic Diseases //INTERNATIONAL JOURNAL OF HEALTH SYSTEMS AND MEDICAL SCIENCES. – 2022. – Т. 1. – №. 4. – С. 231-239.
2. Nutfilloevna A. D. Features of Allergy Diagnosis in Children //INTERNATIONAL JOURNAL OF HEALTH SYSTEMS AND MEDICAL SCIENCES. – 2022. – Т. 1. – №. 4. – С. 217-225.
3. Nutfulloyevna A. D., Odilbekovich Q. O. VARIOUS CHANGES TO THE SKIN CONDITIONS IN CHILDREN WITH ATOPIC DERMATITIS //EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE. – 2022. – Т. 2. – №. 3. – С. 76-81.
4. Achilova D. N., Yomgurova O. R. CLINICAL-IMMUNOLOGICAL AND MEDICO-SOCIAL ASPECTS OF ALLERGIC DISEASES IN CHILDREN, DEVELOPMENT OF CRITERIA FOR EARLY DIAGNOSIS AND PROGNOSIS OF THE COURSE OF THE DISEASE (LITERATURE REVIEW) //British Medical Journal. – 2022. – Т. 2. – №. 2.
5. Nutfulloyevna A. D., Odilbekovich Q. O. Atopic Dermatitis and Its Complications. Immunological Aspects of the Course of Atopic Dermatitis in Children //Spanish Journal of Innovation and Integrity. – 2022. – Т. 4. – С. 137-141.
6. Nutfulloyevna A. D., Odilbekovich Q. O. VARIOUS CHANGES TO THE SKIN CONDITIONS IN CHILDREN WITH ATOPIC DERMATITIS //EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE. – 2022. – Т. 2. – №. 3. – С. 76-81.
7. Саидова М. М., Камилова У. К. Сердечно-сосудистый риск по шкале MSCORE у больных ревматоидным артритом //Евразийский кардиологический журнал. – 2019. – №. S1. – С. 381.
8. Саидова М. М., Камилова У. К. Анализ встречаемости кардиоваскулярной коморбидности у больных ревматоидным артритом //Артериальная гипертензия 2017 как междисциплинарная проблема. – 2017. – С. 41-42.
9. Saidova M., Kamilova U., Yusupaliev B. GW29-e1132 Evaluation cardiovascular risk indices in patients with rheumatoid arthritis //Journal of the American College of Cardiology. – 2018. – Т. 72. – №. 16S. – С. C216-C216.

10. Саидова М. М., Хамроева Ю. С. Сердечно-сосудистый риск у больных системной склеродермией //Новый день в медицине. – 2021. – №. 1. – С. 265-269.
11. Саидова М. М., Хамроева Ю. С. Cardiovascular risk in patients with systemic scleroderma //Новый день в медицине. – 2020. – №. 1. – С. 367-370.
12. Касимова Т. Ю., Аршин Е. В., Туев А. В. Ремоделирование левого желудочка сердца у больных ревматоидным артритом в сочетании с артериальной гипертензией //Российский кардиологический журнал. – 2008. – №. 1. – С. 17-21.
13. Саидова М. М. Оценка параметров толщины интима-медиа сонных артерий как раннего предиктора развития атеросклероза у больных ревматоидным артритом //Journal of cardiorespiratory research. – 2022. – Т. 1. – №. 1. – С. 58-60.
14. Ilkhomovna K. D. Morphological Features of Tumor in Different Treatment Options for Patients with Locally Advanced Breast Cancer //International Journal of Innovative Analyses and Emerging Technology. – 2021. – Т. 1. – №. 2. – С. 4-5.
15. Khodzhaeva D. I. Changes in the Vertebral Column and Thoracic Spinecells after Postponement of Mastoectomy //International Journal of Innovative Analyses and Emerging Technology. – 2021. – Т. 1. – №. 4. – С. 109-113.
16. Khodjayeva D. I. MORPHOLOGY OF IDIOPATHIC SCOLIOSIS BASED ON SEGMENT BY SEGMENT ASSESSMENT OF SPINAL COLUMN DEFORMITY //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 208-215.
17. Ilkhomovna K. D. Modern Look of Facial Skin Cancer //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 85-89.
18. Ходжаева Д. И. Современные возможности ультразвуковой диагностики рака кожи лица //Вопросы науки и образования. – 2021. – №. 25 (150). – С. 21-24.
19. Aslonov S. G. et al. Modern Approaches to Oropharyngeal Cancer Therapy //International Journal of Discoveries and Innovations in Applied Sciences. – 2021. – Т. 1. – №. 3. – С. 38-39.
20. Khodjayeva D. I. MORPHOLOGY OF IDIOPATHIC SCOLIOSIS BASED ON SEGMENT BY SEGMENT ASSESSMENT OF SPINAL COLUMN DEFORMITY //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 208-215.
21. Khodjaeva D. I. Magnetic-resonance imaging in the diagnosis of breast cancer and its metastasis to the spinal column //Scientific progress. – 2021. – Т. 2. – №. 6. – С. 540-547.
22. Ilkhomovna K. D. MANIFESTATIONS OF POST-MASTECTOMY SYNDROME, PATHOLOGY OF THE BRACHIAL NEUROVASCULAR BUNDLE IN CLINICAL MANIFESTATIONS //Innovative Society: Problems, Analysis and Development Prospects. – 2022. – С. 225-229.
23. Khodzhaeva D. I. Modern Possibilities of Ultrasounddiagnostics of Skin Cancer //IJTIMOIY FANLARDA INNOVASIYA ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 101-104.
24. Ilkhomovna K. D. Modern Look of Facial Skin Cancer //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 85-89.
25. Sultonova N. A. THE PROBLEM OF ADDICTED MISSING OF PREGNANCYIN EARLY STAGES OF PREGNANCY //Oriental Journal of Academic and Multidisciplinary Research. – 2023. – Т. 1. – №. 1. – С. 94-101.
26. Sultonova N. A. Dopplerometric Features of Blood Flow Changes in the Utero-Placental System in Women With Related Pregnancy Mission //Miasto Przyszłości. – 2023. – Т. 34. – С. 268-273.

27. Sultonova N. A. Evaluation of Clinical and Instrumental Results of Patients with a Risk of Development of Recurrent Mission //Central Asian Journal of Medical and Natural Science. – 2023. – Т. 4. – №. 2. – С. 536-542.
28. Султонова Н. А., Негматуллаева М. Н. Значимость Применения Витамина И Минеральной Комплексной Терапии В Профилактике Невынашивания Беременности //Central Asian Journal of Medical and Natural Science. – 2021. – С. 388-392.
29. Тиллоева Ш. Ш., Давлатов С. С. Эффективность и переносимость локсидола в лечение ревматоидного артрита у пациентов старших возрастных групп //Central Asian Journal of Medical and Natural Science. – 2021. – С. 432-436.
30. Тиллоева Ш. Ш. и др. Estimation of the condition of the cardiorespiratory system of patients with the concilation of bronchial asthma and arterial hypertension, effects of complex therapy //Новый день в медицине. – 2020. – №. 2. – С. 227-230.
31. Tillaeva S. S. et al. Currency and diagnostic criteria of rheumatoid arthritis in patients of senior age groups //Asian Journal of Multidimensional Research (AJMR). – 2018. – Т. 7. – №. 11. – С. 184-188.
32. Pkhomovna K. D. Morphological Features of Tumor in Different Treatment Options for Patients with Locally Advanced Breast Cancer //International Journal of Innovative Analyses and Emerging Technology. – 2021. – Т. 1. – №. 2. – С. 4-5.
33. Khodzhaeva D. I. Changes in the Vertebral Column and Thoracic Spinecells after Postponement of Mastoectomy //International Journal of Innovative Analyses and Emerging Technology. – 2021. – Т. 1. – №. 4. – С. 109-113.
34. Khodjayeva D. I. MORPHOLOGY OF IDIOPATHIC SCOLIOSIS BASED ON SEGMENT BY SEGMENT ASSESSMENT OF SPINAL COLUMN DEFORMITY //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 208-215.
35. Pkhomovna K. D. Modern Look of Facial Skin Cancer //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIIY JURNALI. – 2021. – Т. 1. – №. 1. – С. 85-89.
36. Urinbaevna Y. R. Features of Prediction of the Severity of Iron Deficiency in Helicobacter Pylori Infection //Scholastic: Journal of Natural and Medical Education. – 2023. – Т. 2. – №. 4. – С. 93-99.
37. Юлдашова Р. У. ЭПИДЕМИОЛОГИЧЕСКАЯ ХАРАКТЕРИСТИКА ЖЕЛЕЗОДЕФИЦИТНОЙ АНЕМИИ У ДЕТЕЙ И ПОДРОСТКОВ В РЕСПУБЛИКЕ УЗБЕКИСТАН ЗА 2007-2019 ГОДЫ //Новый день в медицине. – 2020. – №. 4. – С. 742-747.
38. Юлдашова Р. У., Жарылкасынова Г. Ж., Сафоев Б. Б. МОДЕРНИЗАЦИЯ КУРСА ДОВРАЧЕБНОЙ НЕОТЛОЖНОЙ ПОМОЩИ В БУХАРСКОМ ГОСУДАРСТВЕННОМ МЕДИЦИНСКОМ ИНСТИТУТЕ КАК ОДИН ИЗ УСОВЕРШЕНСТВОВАННЫХ МЕТОДОВ ОБУЧЕНИЯ (в рамках проекта ModeNEd) //Оптимизация высшего медицинского и фармацевтического О-62 образования: менеджмент качества и инновации: материалы IX внутривузовской научно-практической конференции.—Челя-бинск: Издательство Южно-Уральского государственного меди-цинского университета, 2018.—153,[1] с. – 2018. – С. 150.
39. Юлдашова Р. У. и др. ИСПОЛЬЗОВАНИЕ СИСТЕМЫ ДИСТАНЦИОННОГО ОБУЧЕНИЯ MOODLE ПРИ ПОВЫШЕНИИ КВАЛИФИКАЦИИ ВРАЧЕЙ //Оптимизация высшего медицинского и фармацевтического об-О-62 разования: менеджмент качества и инновации: материалы VIII внутривузовской научно-практической конференции.—Челя-бинск: Издательство Южно-Уральского государственного меди-цинского университета, 2017.—136 с. – 2017. – С. 135.

40. Юлдашова Р. У., Халилова Ф. А., Тошева Х. Б. ОТНОШЕНИЕ СТУДЕНТОВ И ПРЕПОДАВАТЕЛЕЙ К ИСПОЛЬЗОВАНИЮ СОЦИАЛЬНЫХ СЕТЕЙ В ОБУЧЕНИИ //Педагогический профессионализм в образовании. – 2015. – С. 218-219.
41. Ilkhomovich A. N. Semirish Va Gipoterioz Kasalliklarining O'zaro Bog'liqlik Sabablari //AMALIY VA TIBBIYOT FANLARI ILMIY JURNALI. – 2023. – Т. 2. – №. 12. – С. 101-106.
42. Ilkhomovich A. N. Pancreas in a Patient with Diabetes Mellitus the Current State of the Issue //American Journal of Pediatric Medicine and Health Sciences (2993-2149). – 2023. – Т. 1. – №. 9. – С. 501-506.
43. Nasirova S. Z. Polypharmacy As An Actual Problem Of Pharmacotherapy //The American Journal of Medical Sciences and Pharmaceutical Research. – 2021. – Т. 3. – №. 01. – С. 1-5.
44. Nasirova S. Z. MORPHOMETRIC PARAMETERS OF THE LIMPHOID TISSUE OF THE SMALL INTESTINE WHEN USING ANTI-INFLAMMATORY DRUGS //Asian journal of pharmaceutical and biological research. – 2022. – Т. 11. – №. 2.
45. Zurovna N. S. EFFECTS AND ACTIONS OF SILYBUM MARIANUM PHYTOPREPARATION //Научный Фокус. – 2023. – Т. 1. – №. 3. – С. 300-308.
46. Nasirova S. Z. Effect of anti-inflammatory medicines on the morphometric structure of the peyer's patches on the small intestine //Modern views and research. International scientific and practical Conference Egham.-England. – 2021. – С. 85-86.
47. Nasirova S. Z., Samadov A. T. Changes in morphometric parameters of the small intestine in the conditions of polypragmasy //Тиббиётда янги кун. – 2021. – Т. 2. – №. 34/1. – С. 28-32.
48. Nasirova S. Z. Changes in morphometric parameters of the lymphoid tissue of the small intestine in the conditions of polypragmasia //American Journal of Medicine and Medical Sciences.-America N. – 2021. – Т. 11. – С. 673-677.
49. Zurovna N. S. MAIN EFFECTS OF SÍLYBUM MARIÁNUM //Asian journal of pharmaceutical and biological research. – 2023. – Т. 12. – №. 1.
50. Ozodov J. H. MORPHOLOGICAL ANALYSIS OF HUMAN SKIN AND THE SKIN OF TAIL IN MICE //International Bulletin of Applied Science and Technology. – 2022. – Т. 2. – №. 11. – С. 166-175.
51. Ozodov J. H. MORPHOLOGICAL ANALYSIS OF HUMAN SKIN AND THE SKIN OF TAIL IN MICE //International Bulletin of Applied Science and Technology. – 2022. – Т. 2. – №. 11. – С. 166-175.
52. Ozodov J. H. BUXORO VILOYATIDA 2019-2022 YILLARDA LEYSHMANIOZ KASALLIGINING KLINIK SHAKLLARI UCHRASH DARAJASI TUMANLAR KESIMIDA //RESEARCH AND EDUCATION. – 2022. – Т. 1. – №. 9. – С. 428-436.
53. Ozodov J. H. et al. EARLY EFFECTS OF TATTOOING ON MOUSE SKIN MORPHOLOGY AND MAIN DIFFERENTIAL FEATURES WITH NORMAL SKIN //International Journal of Medical Sciences And Clinical Research. – 2022. – Т. 2. – №. 11. – С. 47-57.