



Ultrasound and MSCT as the Next Step in the Evolution of the Examination of Patients with Ventral Hernias

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Abstract: When choosing the tactics of surgical treatment of hernia carriers, due to their high sensitivity (ultrasound 81.8%, computed tomography 87.1%), a comprehensive preoperative examination of the tissues of the anterior abdominal wall and abdominal cavity using ultrasound diagnostics and computed tomography is required. Performing stress tests (Valsalva maneuver and plank exercises) during ultrasound diagnosis and CT scan increases their sensitivity (ultrasound 86.7%, CT scan 89.9%), specificity (ultrasound 58.3%, CT scan 55.8%), positive predictive value (ultrasound 94%, computed tomography 96.4%). With the prostate and the availability of these techniques, this determines the need for their introduction into the daily practice of diagnosing ventral hernias. Computed tomography should be preferred because of its high sensitivity of 95.5% ($p < 0.001$) and its positive predictive value of 98% ($p < 0.01$). When evaluating the adhesion process in the hernia sac, the use of ultrasound (ultrasound 96.5%, computed tomography 94.7%) is recommended due to sensitivity, availability and safety method. All this now makes it possible, with greater accuracy and less risk of repeated interventions for the patient, to determine the choice and indications of modern methods of repairing abdominal hernias.

Key words: ventral hernia, stress test, ultrasound, MSCT, diagnosis of ventral hernias.

Introduction. The problem of surgical treatment of patients with abdominal hernias does not lose its relevance in our time. This is due to a large number of patients with this pathology, as well as a constantly high percentage of disease relapses after reconstructive surgeries of 24-44%. Equivalent to plastic-reconstructive surgery, hernia repair can become an urgent intervention due to the complications that arise, which do not allow full use of the possibilities of prosthetic and other technologies in the treatment of abdominal hernia, and lead subsequently to a recurrence of the hernia. A variety of hernia repair methods and their modifications are, on the one hand, an indisputable fact of unsatisfactory results in the treatment of hernias of the abdominal wall, and, on the other hand,

evidence of a constant search for a solution to this problem. . To date, there is no clear algorithm and unified standards in the diagnosis and choice of tactics for the treatment of abdominal wall hernia based on the results of physical examination, ultrasound (ultrasound) and computed tomography (CT). Which may be due to a large discrepancy between physical, ultrasound and CT data. Modern literary sources mainly deal with narrow issues of scanning or examining the abdominal wall using magnetic resonance imaging (MRI) method in patients with hernias, without the results of their treatment. The main difficulty in examining hernia carriers is that diagnostic criteria that can reliably reflect structural and functional changes in the anterior abdominal wall in a patient with postoperative abdominal wall hernia (POVH) do not have yet been defined. All this, despite the accumulated experience and the large number of different research works, makes it difficult to establish and introduce into practical medicine a unified tactic for the preoperative and postoperative examination of hernia carriers.

Purpose of the study: To improve diagnostic and treatment outcomes for patients with ventral hernias by establishing baselines of sensitivity and specificity of ultrasound and CT in the diagnosis of ventral hernias of the anterior abdominal wall, and improve the outcomes of these methods by introducing stress tests into clinical practice (Valsalva test, “bar” level).

research materials and methods. The work is based on the examination of 107 patients with a median location of POVH. Among the hernia carriers were 35 (32.7%) men and 72 (67.3%) women. Patients with hernias were first examined for anamnestic and physical examinations. They corresponded to age groups: young patients (18-44 years) - 7 (6.5%), average age (45-59 years) - 25 (23.4%), elderly people (60-74 years) - 51.4% (55 people), senile age (75-90 years) - 20 (18.7%). According to body mass index (BMI), the patients examined had the following distribution: patients with BMI < 16 kg/m² - 2 (1.9%), 16-18.5 kg/m² - 2 (1.9%), 18.5-24.9 kg/m² - 9 (8.4%) overweight people - 23 (21.5%) people with grade I obesity - 42 (39.3%) with grade II obesity - 27 (25.2%) with obesity III. Grades - 2 (1.9%) patients. The size of the hernial defect was determined using the Chevrel-Rath classification according to the National Clinical Guidelines for Herniology 2018, which found a small hernial ring (W1) in 28 (26.2%) patients, moderate (W2) - in 58 (54.2%), large (W3) - in 21 (19.6%).

These patients were divided into the main group of 49 patients and the control group - 58 patients. The groups were representative according to the above criteria as well as body mass index and concomitant somatic pathology. In the control group, the surgical tactics were determined taking into account the data of the physical examination and the intraoperative image. In the main group, after a physical examination, an instrumental examination of the anterior abdominal wall was performed, after which surgical correction was chosen. The instrumental examination phase of the hernia carrier began with ultrasound examination of the tissues in the postoperative scar area on the SonoScape S50 device with linear and convex probes. The hernial orifice, hernial sac, and residual postoperative scar and fascia were examined, with no hernia found on physical examination. Subsequently, hernia carriers underwent multispiral CT of the abdominal wall using the GE Revolution EVO device in slice configuration, with an evaluation of criteria similar to that of ultrasound.

When evaluating the effectiveness of using ultrasound and computed tomography in hernia carriers, the main diagnostically significant features affecting the choice of surgical treatment were considered: the nature of the contents of the hernial sac, the severity of the adhesion process in it, the presence of additional hernia defects that are not by physical examination methods can be determined. The methods were evaluated according to their level of sensitivity and specificity for the pathology detected.

Sensitivity was determined by the formula: $IP / (IP + LO)$, with a true positive (TP) result being noted when the presence of a symptom in the herniated subject during the study (ultrasound / CT) corresponded to the description of the intraoperative image, a false negative result (LO) during the examination (ultrasound/scanner) of the herniated patient, the sign was not recognized but was present

in the description of the intraoperative image. Sensitivity thus characterized the proportion of patients in whom the positive results of the detection of a detectable sign (ultrasound/scanner) fully corresponded to the intraoperative observation of the sign sought.

Specificity was determined by the formula: $IE/(IE+LP)$, with the true negative result (TI) in hernia recipients in whom the absence of a sign on examination (ultrasound/CT) matched the description of the intraoperative image. False positive result (FP) when a sign was described in hernia carriers on ultrasound/CT but was missing in the description of the intraoperative image. Specificity thus characterized the proportion of patients in whom the negative results of the detection of a detectable sign (ultrasound/scanner) were entirely consistent with the intraoperative finding of the sign sought.

The prognostic value of a positive result determined the likelihood of detecting the desired symptom in an accurate diagnosis of postoperative abdominal wall hernia. The predictive value of a positive result was calculated using the following formula: $PI/(PI+LP)$.

The predictive value of a negative result determined the probability of recognizing the desired symptom in the absence of a postoperative abdominal wall hernia. The predictive value of a negative result was calculated using the following formula: $LO/(LO+IO)$. The ratio of the last two frequencies has the meaning of relative risk when patients with a positive diagnosis are considered a risk group.

In order to reproduce the state of the abdominal wall during motor activity of the hernia carrier under natural conditions, as well as to study the sensitivity and specificity of ultrasound and CT, three functional tests were performed sequentially: 1) "at rest" - the lying position; 2) Valsalva test (Valsalva tension) - forced exhalation with nose and mouth closed; 3) Stand "bar" (classic or simplified) - a static isometric exercise in a horizontal posture on the elbows with an tense press. Patients performed the Valsalva maneuver and the standing plank within 20 seconds, the time interval needed for an ultrasound or CT scan of the abdominal wall.

Student's t test was used to compare study groups. The reliability of the results was judged positive ($p<0.05$) or superior upon receipt.

Results and its discussion:

Examination of patients with postoperative abdominal wall hernia, for "contents of hernial sac", "adhesions in hernial sac"; the presence of "hidden fascial defects and additional hernia sacs" showed that when the hernia carrier was in a resting position, according to ultrasound: sensitivity averaged in the range of 71.8 to 90.8% (81.8%), specificity 37.5 - mean 57.9% (50.3%), mean positive predictive value 87.5-95.7% (92.5%), mean mean negative predictive 15-35.7% (28.0%) . The scanner determined: sensitivity 79.2-95.9% average (87.1%), specificity 36.4-60% average (48.8%), positive predictive value 91.5-96.7% average (94.7%), the predictive value of a negative result is 16.7-60% on average (31.4%).

At the same time, when comparing diagnostic methods in the study of the "contents of the hernial sac", advantages were found in the CT study: ultrasound / CT sensitivity 82.8 / 86.1%, specificity 37.5/50%, positive predictive value 94.3/96. 7%, negative predictive value 15/17.6%, these results are not reliable, but determine the trend.

When evaluating the resolution of diagnostic methods for hernial sac adhesions, the advantages of ultrasound were highlighted. Thus, the sensitivity of the ultrasound/scanner was 90.8/79.2% ($p<0.05$), the specificity 55.6/36.4% ($p<0.01$), the predictive value positive of 95.7/91.6%, the predictive value of a negative result was 35.7/16.7% ($p<0.001$).

When evaluating the resolution of ultrasound and CT methods for examining "hidden defects and identified hernia sacs" at rest, the following differences were found: ultrasound/CT sensitivity

71.8/95.9% ($p < 0.001$), specificity 57.9/60.0%, positive predictive value 85.7/95.9% ($p < 0.05$), negative predictive value 33.3/60% ($p < 0.001$).

In order to improve the informative content of the study, stress tests (Valsalva test and "Bar" exercise) were used. By using these samples, the informative content of ultrasound and CT scans could be significantly increased compared to examinations at rest. Thus, according to the results of the ultrasound in the stress tests: the sensitivity varied from 72.1 to 96.9% on average (86.7%), the specificity 4081.8% on average (58.3%), the positive predictive value 87.397.9% on average (94%), the predictive value of a result is on average 12 to 69.2% (43.8%). Based on CT results in stress tests: mean sensitivity between 79.4 and 99% (89.9%), mean specificity between 40 and 66.7% (55.8%), mean positive predictive value between 92.8 and 98.1% (96.4%).), mean negative predictive value of 12 to 69.2% (38%).

Thanks to the group's internal evaluation of stress tests, we were able to specify that the best results of the study "for adhesions in the hernial sac" were obtained with stress tests (Valsalva test + exercise "plank") in ultrasound compared to CT: ultrasound/CT sensitivity 96.5/94.7%, specificity 50/60.7%, positive predictive value 96.5/98.5%, negative predictive value 50/40.7%.

When evaluating the informational content of stress tests in the study "for the presence of hernial sac contents", no significant difference was found between ultrasound and CT, but a trend in favor of CT scans: sensitivity 86.9/79.4%, specificity 40% ($p < 0.001$), positive predictive value 96.5/92.8%, negative predictive value 40.6/16.7% ($p < 0.001$).

When looking for "hidden" fascial defects and additional hernial sacs in exercise testing, the best results were found with CT examination compared to ultrasound: ultrasound/CT sensitivity 76.6/95.5% ($p < 0.001$), specificity 62.7/66.0%, positive predictive value 89.1/98% ($p < 0.01$), negative predictive value 40.9/56.7% ($p < 0.05$).

Conclusion.

1. Examination of a patient with a postoperative ventral hernia should be comprehensive, and include ultrasound and computed tomography of the study of the anterior abdominal wall and abdominal cavity to characterize the parameters of hernia formations, the presence of adhesions in them, as well as "hidden" defects of the postoperative scar, due to their high sensitivity to ultrasound examination 81.8%, computed tomography 87.1%.
2. Performing stress tests in the study of patients by ultrasound and computed tomography allows you to increase: the sensitivity of ultrasound, specificity, predictability and negative results. Stress tests on computed tomography can increase: sensitivity, specificity, predictive value of positive and negative results.
3. In determining the "contents of the hernial sac", the search and evaluation of "hidden" defects of the aponeurosis, and additional hernial sacs, at rest and under load, computed tomography can be considered the most informative method.
4. To assess the "adhesive process in the hernial sac", at rest and under load, it is more advisable to use ultrasound, the effectiveness of which is probably determined by the unlimited time and freedom of choice of position in the patient's study.

Список литературы

1. Abdurakhmanovich, K. O., & Javlanovich, Y. D. (2022). Magnetic Resonance Tomography for Damage to the Ligamentous Structures of the Knee Joint. CENTRAL ASIAN JOURNAL OF

- MEDICAL AND NATURAL SCIENCES, 3(2), 27-34. Retrieved from <https://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/617>
2. Abdurakhmanovich, K. O., & Servetovna, A. A. (2022). Guidelines for Ultrasound Examination in Gynecological Diseases. *CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES*, 3(2), 22-26. Retrieved from <https://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/616>
 3. Abdurakhmanovich, K. O., & ugli, G. S. O. (2022). Ultrasonic Diagnosis Methods for Cholelithiasis. *CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES*, 3(2), 43-47.
 4. Abdurakhmanovich, K. O., & ugli, G. S. O. (2022). Ultrasound Diagnosis of the Norm and Diseases of the Cervix. *CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES*, 3(2), 58-63.
 5. Abdurakhmanovich, Khamidov Obid, Akhmedov Yakub Amandullaevich, Ataeva Saodat Khurshedovna, Ametova Alie Servetovna, and Karshiev Behruz Orif ugli. 2021. "Role of Kidney Ultrasound in the Choice of Tactics for Treatment of Acute Renal Failure". *CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES* 2 (4), 132-34. <https://doi.org/10.47494/cajmns.v2i4.263>.
 6. Akhmedov Y.A., Rustamov U.Kh., Shodieva N.E., Alieva U.Z., Bobomurodov B.M. Modern Application of Computer Tomography in Urology. *Central Asian journal of medical end natural sciences*, volume 2 issue 4 Jul-Aug 2021 P.121-125
 7. Amandullaevich AY, Danabaevich JK. Ultrasound Diagnosis of Hirschsprung's Disease in Children. *CAJMNS* [Internet]. 2022Mar.3 [cited 2022May24];3(2):64-1. Available from: <https://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/623>
 8. Amandullaevich AY, Zafarjonovich UZ. Possibilities of MRI Diagnostics of Focal Liver Defects. *CAJMNS* [Internet]. 2022Mar.3 [cited 2022May24];3(2):35-2. Available from: <https://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/618>
 9. Amandullaevich, Akhmedov Yakub, Rustamov Umar Khaidarovich, Shodieva Nodira Egamberdievna, Alieva Umida Zairovna, and Bobomurodov Bektosh Mamadiyorovich. 2021. "Modern Application of Computer Tomography in Urology". *CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES* 2 (4), 121-25. <https://doi.org/10.47494/cajmns.v2i4.261>.
 10. Ametova Alie Servetovna, Saitkulova Shahribonu Rakhmatillevna, Khaidarova Aziza Anvarovna. Early Rheumatoid Arthritis: Possibilities Of Mri Diagnosis. *TJMS* [Internet]. 2022 Feb. 24 [cited 2022 May 24];5:260-6. Available from: <https://zienjournals.com/index.php/tjm/article/view/879>
 11. Ataeva S.Kh., Ravshanov Z.Kh., Ametova A.S., Yakubov D.Zh. Radiation visualization of chronic joint diseases. *Central Asian journal of medical end natural sciences*, volume 2 issue 2 March-april 2021 P.12-17
 12. Ataeva Saodat Khurshedovna, Ravshanov Zafar Khazratkulovich, Ametova Alie Servetovna, and Yakubov Doniyor Zhavlanovich. 2021. "Radiation Visualization of Chronic Joint Diseases". *CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES* 2 (2), 12-17. <https://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/107>.
 13. Doniyor Javlanovich Yakubov, Zafar Berdimuradovich Karimov, Sherzod Obid Ugli Gaybullaev, and Mehriddin Mashrab Ugli Mirzakulov. "ULTRASONIC AND RADIOLOGICAL PICTURE IN THE COMBINATION OF CHRONIC VENOUS INSUFFICIENCY AND

OSTEOARTHRITIS OF THE KNEE JOINTS" Academic research in educational sciences, vol. 3, no. 5, 2022, pp. 945-956.

14. Is lower extremity vein pathology a risk factor for the development of osteoarthritis of the knee joint? / I. Yu. Khodzhanov, B. M. Mamasoliev, A. N. Tkachenko [et al.] // Ural medical journal. – 2022. – Vol. 21, № 2. – P. 19-25. <http://doi.org/10.52420/2071-5943-2022-21-2-19-25>.
15. Khamidov O. A., Khodzhanov I. Yu., Mamasoliev B.M., Mansurov D.Sh., Davronov A.A., Rakhimov A.M. The Role of Vascular Pathology in the Development and Progression of Deforming Osteoarthritis of the Joints of the Lower Extremities (Literature Review). Annals of the Romanian Society for Cell Biology, Romania, Vol. 25, Issue 1, 2021, Pages. 214 – 225
16. Khamidov O.A., Akhmedov Y.A., Ataeva S.Kh., Ametova A.S., Karshiev B.O. Role of Kidney Ultrasound in the Choice of Tactics for Treatment of Acute Renal Failure. Central Asian journal of medical end natural sciences, volume 2 issue 4 Jul-Aug 2021 P.132-134
17. Khamidov O.A., Akhmedov Y.A., Yakubov D.Zh., Shodieva N.E., Tukhtaev T.I. DIAGNOSTIC POSSIBILITIES OF USES IN POLYCYSTOSIS OF KIDNEYS. Web of scientist: International scientific research journal, volume 2 issue 8 August 2021 P.27-33
18. Khamidov O.A., Ataeva S.Kh., Ametova A.S., Yakubov D.Zh., Khaydarov S.S. A Case of Ultrasound Diagnosis of Necrotizing Papillitis. Central Asian journal of medical end natural sciences, volume 2 issue 4 Jul-Aug 2021 P.103-107
19. Khamidov O.A., Ataeva S.Kh., Yakubov D.Zh., Ametova A.S., Saytkulova Sh.R. ULTRASOUND EXAMINATION IN THE DIAGNOSIS OF FETAL MACROSOMIA. Web of scientist: International scientific research journal, volume 2 issue 8 August 2021 P.49-54
20. Khamidov O.A., Mirzakulov M.M., Ametova A.S., Alieva U.Z. Multispiral computed tomography for prostate diseases. Central Asian journal of medical end natural sciences, volume 2 issue 2 March-april 2021 P.9-11
21. Khamidov O.A., Normamatov A.F., Yakubov D.Zh., Bazarova S.A. Respiratory computed tomography. Central Asian journal of medical end natural sciences, volume 2 issue 2 March-april 2021 P.1-8
22. Khamidov O.A., Urozov U.B., Shodieva N.E., Akhmedov Y.A. Ultrasound diagnosis of urolithiasis. Central Asian journal of medical end natural sciences, volume 2 issue 2 March-april 2021 P.18-24
23. Khamidov O.A., Yakubov D.Zh., Alieva U.Z., Bazarova S.A., Mamaruziev Sh.R. Possibilities of Sonography in Differential Diagnostics of Hematuria. Central Asian journal of medical end natural sciences, volume 2 issue 4 Jul-Aug 2021 P.126-131
24. Khamidov O.A., Yakubov D.Zh., Ametova A.S., Bazarova S.A., Mamatova Sh.T. Application of the Ultrasound Research Method in Otorhinolaryngology and Diseases of the Head and Neck Organs. International Journal of Development and Public Policy, volume 1 issue 3 August 2021 P.33-37
25. Khamidov O.A., Yakubov D.Zh., Ametova A.S., Turdumatov Zh.A., Mamatov R.M. Magnetic Resonance Tomography in Diagnostics and Differential Diagnostics of Focal Liver Lesions. Central Asian journal of medical end natural sciences, volume 2 issue 4 Jul-Aug 2021 P.115-120
26. Khamidov Obid Abdurakhmonovich, Zhuraev Kamoliddin Danabayevich, Khamrokulov Munis Mukhsinovich, Azimova Kamola Alisherovna, and Sayfiev Davron Dilshod Ugli. "THE ROLE OF COMPUTED TOMOGRAPHY IN THE DIAGNOSIS OF CHOLELITHIASIS (LITERATURE REVIEW)".

The American Journal of Medical Sciences and Pharmaceutical Research, vol. 4, no. 04, Apr. 2022, pp. 1-7, doi:10.37547/TAJMSPR/Volume04Issue04-01.

27. Khamidov Obid, Ametova Alie, and Ravshanov Zafar. "ULTRASONOGRAPHY OF SYNOVIAL CYSTS AND WRIST JOINT". *Involta Scientific Journal*, vol. 1, no. 6, May 2022, pp. 480-9, <https://involta.uz/index.php/iv/article/view/221>.
28. Khodzhibekov M.X., Khamidov O.A., Mardieva G.M. Verification of radiation methods in diagnostics of injuries of the knee joint intra-articular structures. *International Journal of Pharmaceutical Research*. 2020;13(1), p. 302-308.
29. Khurshedovna AS, Danabaeovich JK. Ultrasound Diagnosis of Fetoplacental Insufficiency. *CAJMNS* [Internet]. 2022Mar.3 [cited 2022May24];3(2):53-7. Available from: <https://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/621>
30. Khurshedovna AS, Zafarjonovich UZ. Ultrasound Examination for the Diagnosis of Acute Appendicitis. *CAJMNS* [Internet]. 2022Mar.3 [cited 2022May24];3(2):72-7. Available from: <https://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/624>
31. Obid Abdurakhmanovich Khamidov, Saodat Khurshedovna Ataeva, Zafar Narbay Ugli Nurmurzaev PATHOLOGY OF LOWER EXTREMITY VEINS IN OSTEOARTHRITIS OF KNEE JOINTS // Academic research in educational sciences. 2022. №5. URL: <https://cyberleninka.ru/article/n/pathology-of-lower-extremity-veins-in-osteoarthritis-of-knee-joints> (дата обращения: 29.08.2022).
32. Parshakov A.A Prevention of complications of incisional hernia repair: current problem state (review) / A.A. Parshakov, V.A. Gavrillov, V.A. Samartsev // *Sovremennye tehnologii v medicine*. - 2018. - Vol. 10 (2). - P.175-186. -<https://doi.org/10.17691/stm2018.10.2.21>
33. Poruk K.E. Effect of hernia size on operative repair and post-operative outcomes after open ventral hernia repair / K.E. Poruk, N. Farrow, F. Azar, K.K. Burce, C.W. Hicks, S.C. Azoury, P. Cornell, C.M. Cooney, F.E. Eckhauser // *Hernia*. - 2016. - Vol. 20 (6). - P. 805-810. - DOI 10.1007/s10029-016-1542-2
34. Rustamov U.Kh., Shodieva N.E., Ametova A.S., Alieva U.Z., Rabbimova M.U. US-DIAGNOSTICS FOR INFERTILITY. *Web of scientist: International scientific research journal*, volume 2 issue 8 August 2021 P.55-61
35. Rustamov U.Kh., Urinboev Sh.B., Ametova A.S. Ultrasound diagnostics of ectopic pregnancy. *Central Asian journal of medical end natural sciences*, volume 2 issue 2 March-april 2021 P.25-28
36. Yakubov Doniyor Javlanovich, Juraev Kamoliddin Danabaeovich, Gaybullaev Sherzod Obid ugli, and Samiev Azamat Ulmas ugli. "INFLUENCE OF GONARTHROSIS ON THE COURSE AND EFFECTIVENESS OF TREATMENT OF VARICOSE VEINS". *Yosh Tadqiqotchi Jurnal*, vol. 1, no. 4, May 2022, pp. 347-5, <http://2ndsun.uz/index.php/yt/article/view/287>.
37. Yakubov DZh, Gaybullaev ShO. The diagnostic importance of radiation diagnostic methods in determining the degree of expression of gonarthrosis. *Uzbek journal of case reports*. 2022;2(1):36-40. <https://doi.org/10.55620/ujcr.2.1.2022.7>
38. Zhavlanovich YD, Servetovna AA. Ultrasonography and its Role in Clinical Diagnosis. *CAJMNS* [Internet]. 2022Mar.3 [cited 2022May24];3(2):48-2. Available from: <https://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/620>
39. Атаева С.Х., Ахмедов Я.А. УЗИ высокого разрешения для детской патологии мошонки. *Uzbek journal of case reports*. 2022;2(1)

40. Балглей А.Г., Ткаченко А.Н., Хайдаров В.М., Мансуров Д.Ш., Уразовская И.Л. Частота и структура осложнений при артроскопическом лечении остеоартрита коленного сустава // Вестник Северо-Западного государственного медицинского университета им. И.И. Мечникова. - 2022. - Т. 14. - №2. - С. 35-47. doi: 10.17816/mechnikov108370
41. Борисов А.Е. К вопросу о факторах риска рецидивов послеоперационных вентральных грыж / А.Е. Борисов, С.К. Малков, Сафа Хуссейн Салех // сб. научных работ ежегодн. конф. ассоциации хирургов Санкт-Петербурга. - СПб. - 2002. - С.81-83.
42. 3.3. Умаркулов, Б.М. Мамасолиев. Влияние посттравматической хондропатии на функциональное состояние коленных суставов у спортсменов. Uzbek journal of case reports. 2022;2(1):31-35. <https://doi.org/10.55620/ujcr.2.1.2022.6>
43. Камолиддин Данабаевич Жураев, Обид Абдурахмонович Хамидов, Дониёр Жавлонович Якубов, Сардор Икром Угли Акбаров УЛЬРАЗВУКОВОЕ ИССЛЕДОВАНИЕ ЩИТОВИДНОЙ ЖЕЛЕЗЫ // Scientific progress. 2022. №3. URL: <https://cyberleninka.ru/article/n/ulrazvukovoe-issledovanie-schitovidnoy-zhelezy> (дата обращения: 29.08.2022).
44. Карапыш Д.В. Гигантские послеоперационные вентральные грыжи, осложненные острой кишечной непроходимостью, - сложный вопрос ургентной хирургии и пути его решения / Д.В. Карапыш // Вестник новых медицинских технологий. - 2013. - №3. - С.88-91.
45. Hamidov Obid Abdurahmanovich. "DIAGNOSTICS OF INJURIES OF THE SOFT TISSUE STRUCTURES OF THE KNEE JOINT AND THEIR COMPLICATIONS" European research, no. 1 (37), 2020, pp. 33-35.
46. Обид Абдурахманович Хамидов, Саодат Хурshedовна Атаева, Зафар Нарбай Угли Нурмурзаев ПАТОЛОГИЯ ВЕН НИЖНИХ КОНЕЧНОСТЕЙ ПРИ ОСТЕОАРТРИТЕ КОЛЕННЫХ СУСТАВОВ // Академические исследования в области педагогических наук. 2022. №5. URL: <https://cyberleninka.ru/article/n/pathology-of-lower-extremity-veins-in-osteoarthritis-of-knee-joints>.
47. Паршиков В.В. Протезирующая пластика брюшной стенки в лечении вентральных и послеоперационных грыж: классификация, терминология и технические аспекты (обзор) / В.В. Паршиков // Современные технологии в медицине. - 2015. - Т.7, № 2. - С.138-152.
48. Ризаев Ж.А., Хамидов О.А., Рустамова Д.А., Кушаков Б.Ж. СРАВНИТЕЛЬНЫЙ АНАЛИЗ ЛУЧЕВЫХ МЕТОДОВ ИССЛЕДОВАНИЯ ПРИ КОРОНАВИРУСНОЙ ИНФЕКЦИИ SARS-COV-2 (2019-NCOV)// Проблемы биологии и медицины. - 2022. №2. Том. 135. - С. 96-104. DOI: <http://doi.org/>
49. Рузикулов О.Ш., Жураев И.Г., Хамидов О.А., Келдияров А.Х., Мансуров Дж.Ш., Садуллаев О.А. НАСКОЛЬКО НЕОБХОДИМА ОПТИМИЗАЦИЯ ВЕДЕНИЯ БОЛЬНЫХ С ПЕРЕЛОМОМ ШЕЙКИ БЕДРЕННОЙ КОСТИ?// Проблемы биологии и медицины. - 2022. №2. Том. 135. - С. 214-223. DOI: <http://doi.org/>
50. Саматов Ж.Ж., Жураев И.Г., Хамидов О.А., Давлетов Б.И., Мансуров Дж.Ш., Темуров А.А. ЧАСТИЧНЫЕ РАЗРЫВЫ ПЕРЕДНЕЙ КРЕСТООБРАЗНОЙ СВЯЗКИ: ОБЗОР АНАТОМИИ, ДИАГНОСТИКИ И ЛЕЧЕНИЯ// Проблемы биологии и медицины. - 2022. №3. Том. 136. - С. 269-274. DOI: <http://doi.org/>
51. Федосеев А.В. Некоторые особенности белой линии живота, как предвестники послеоперационной грыжи / А.В. Федосеев, С.Ю. Муравьев, Н.В. Бударев, А.С. Инютин,

В.В. Зацаринный // Российский медико-биологический вестник имени академика И.П. Павлова. - 2016. - №1. - С.109-115.

52. Xamidov Obid Abduraxmanovich, Optimization of Radiological Diagnostics of Injuries of the Soft Tissue Structures of the Knee Joint and Their Complications, American Journal of Medicine and Medical Sciences, Vol. 10 No. 11, 2020, pp. 881-884. doi: 10.5923/j.ajmms.20201011.10.
53. Хамидов О.А., Аметова А.С. Инородные тела подвздошной кишки – редкий случай из практики (клиническое наблюдение). Uzbek journal of case reports. 2022;2(1):27-30. <https://doi.org/10.55620/ujcr.2.1.2022.5>
54. Хамидов О.А., Атаева С.Х. Аудит ультразвукового исследования для диагностики острого аппендицита (ретроспективное исследование). Uzbek journal of case reports.2022;2(1):41-45. <https://doi.org/10.55620/ujcr.2.1.2022.8>
55. Хамидов О.А., Нурмурзаев З.Н. Ультразвуковая диагностика дефектов межжелудочковой перегородки на ранних сроках беременности// Проблемы биологии и медицины. - 2022. №3. Том. 136. - С. 124-127. DOI: <http://doi.org/>
56. Хамидов О.А., Равшанов З.Х. Остеонекроз головки бедренной кости после COVID-19: серия случаев. Uzbek journal of case reports. 2022;2(1):
57. Хамидов Обид, Мамасолиев Баходир, and Аметова Алие. “Сравнительный анализ клинических и визуальных характеристик остеомалации и спондилоартрита”. Involta Scientific Journal, vol. 1, no. 6, May 2022, pp. 461-79, <https://involta.uz/index.php/iv/article/view/220>.
58. Хамидов Обид, Мансуров Джалолиддин, and Зарпуллаев Джавохир. “Меры точности магнитно-резонансной томографии 1,5 т для диагностики повреждения передней крестообразной связки, мениска и суставного хряща коленного сустава и характеристики поражений: прогностическое исследование”. Involta Scientific Journal, vol. 1, no. 6, May 2022, pp. 490-11, <https://involta.uz/index.php/iv/article/view/222>.
59. Ходжибеков М.Х., Хамидов О.А. Обоснование ультразвуковой диагностики повреждений внутрисуставных структур коленного сустава и их осложнений. №3 (31), 2020. С.526-529.
60. Якубов Д.Ж., Гайбуллаев Ш.О. Влияние посттравматической хондропатии на функциональное состояние коленных суставов у спортсменов. Uzbek journal of case reports. 2022;2(1):36-40. <https://doi.org/10.55620/ujcr.2.1.2022.7>