ведущую роль играет разработка стратегического плана по внедрению эффективной действующей модели инновационного образования и полноценное развитие профессионализма и личностных качеств будущих специалистов. В этой связи основное усилие учебно – методического управления вуза необходимо направить на системное внедрение новых образовательных технологий обучения и приданию учебному процессу инновационности и креативности.

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Contrast-enhanced ultrasound of kidneys in patients with type 2 diabetes and chronic pyelonephritis: a new dosage of the contrast-enhanced agent

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Abstract

Objective. To evaluate the diagnostic efficacy of the contrast-enhanced ultrasound examination of kidneys in patients with chronic pyelonephritis with a dose of injected contrast agent – 1.0 ml.

Materials and methods. In 2020, 20 patients with chronic pyelonephritis were examined on the basis of the Fundamental research laboratory “Diagnostic Researches and Minimally Invasive Technologies”, Smolensk State Medical University. All patients underwent ultrasound examination Doppler mapping mode of the kidneys and the. Also, all patients underwent contrast-enhanced ultrasound examination of the kidneys for the diagnosis of angionephrosclerosis.

Results. Using the improved technique in patients of group 2 compared with patients in group 1, the quality of the images obtained was preserved. In patients of group 1 with chronic pyelonephritis, the quantitative indicators correspond to the initial manifestations of angionephrosclerosis.

Conclusion. Thus, the improved CEUS technique with the use of 1.0 ml of contrast agent showed good possibilities in the diagnosis of angionephrosclerosis in patients with chronic pyelonephritis.

Key words: contrast-enhanced ultrasound, angionephrosclerosis, non-alcoholic fatty liver disease

Introduction: According to modern data, over the past decade, the number of people with type 2 diabetes mellitus (DM) has doubled [1]. The amount of funds spent on diabetes treatment by the end of 2019 amounted about \$ 760 billion [1, 2]. Globally, the number of

deaths due to complications of diabetes was 4.2 million in 2019. Infectious and inflammatory diseases in patients with diabetes mellitus are observed 4 times more often than with this background pathology. Acute pyelonephritis, turned into chronic pyelonephritis, leads to the development of chronic kidney disease. As chronic kidney disease progresses, the function of the nephrons decreases, which leads to a change in the histoarchitectonics of the kidneys, and, consequently, the loss of initial function.

Objective.: to evaluate the diagnostic efficacy of the contrast-enhanced ultrasound examination of kidneys in patients with DM type 2 diabetes and chronic pyelonephritis with a dose of injected contrast agent – 1.0 ml.

Materials and methods: In 2020, 20 patients with type 2 diabetes and chronic pyelonephritis were examined on the basis of the Fundamental research laboratory “Diagnostic Researches and Minimally Invasive Technologies”, Smolensk State Medical University. The patients' age was 60-78 years. The average age was 64 ± 3.4 years, of which 10 women (50%) and 10 men (50%). All the patients have type 2 diabetes in all was ≥ 20 years. All studied patients were examined in the endocrinology department for assess the disease. This study was conducted in accordance with the European Guidelines for Clinical Practice on contrast-enhanced ultrasound imaging of 2017.

All patients were examined due to a single diagnostic algorithm, which included 2 stages:

Stage 1. Ultrasound examination of the kidneys почек (Hitachi Medical Corporation) in B-mode with an assessment of the size of the right and left kidneys (mm), echogenicity, visualization of large and small vessels using the color Doppler method. (Fig. 1) Renal ultrasound was performed polypositionally. The study begins with a transabdominal approach, using longitudinal, transverse and oblique sections with the patient lying on the right or left side. The following approaches were also used: translumbar (from the back), in this position the sensor is located in the middle of the posterior segment of the XII rib parallel to the long axis of the kidney, and lateral in the frontal plane. If nephroptosis or a "wandering" kidney was suspected, an additional scan was performed in an upright position of the patient during the Valsalva test. To assess the position of the kidneys during ultrasound, we used such landmarks as the acoustic shadow from the XII rib, the dome of the diaphragm or the diaphragmatic contour of the liver, the gate of the spleen.

For imaging the vessels of the kidney in the color Doppler modes a qualitative assessment of renal blood flow along the longitudinal axis was carried out. The study of renal vessels was carried out in the supine position of the patient by measurements means of transverse scanning for a better assessment of the orifices of the arteries. Vessels, the study was carried out in the posterolateral approach with the patient lying on his side to assess the distal segments of the renal arteries and intrarenal.

The varied degree of reactivity of intraparenchymal vessels to endogenous agents against the background of type 2 diabetes determines the variability of blood flow in the cortex and medulla of the kidneys. As chronic kidney disease (CKD) progresses, the normal architectonics of the kidneys was replaced by collagen, thereby reducing the functional constant of the main organ/

To assess the vascularization of the renal parenchyma according to the the color Doppler modes in patients with type 2 diabetes and chronic pielonephritis we used a five-point scale of M. Bertolotto (2000) [6], improved by A.V. Borsukov et al. [9]. In this scale, types from 0 to 4 are distinguished, depending on the degree of vascularization of the vessels (norm - type 0, increase - type 1, minimum decrease - type 2, moderate decrease - type 3, maximum decrease - type 4).

The second stage of the study was a contrast-enhanced ultrasound examination (CEUS) of the kidneys in accordance with European Guidelines for Clinical Practice on contrast-enhanced ultrasound imaging of 2017.

All patients were divided into 2 groups: the 1st group consisted of patients with type 2 diabetes and chronic pyelonephritis ($n = 10$) (2.5 ml of an contrast agent echocontrast drug intravenously); Group 2 ($n = 10$) - patients with type 2 diabetes and chronic pyelonephritis who underwent CEUS using an improved technique (1.0 ml of echocontrast) (Tabl. 1)

The freshly prepared solution was injected intravenously via the ulnar vein (v. ulnaris) using a two-port peripheral venous catheter G19 (diameter 0.9 mm). Then, to achieve a more rapid result of the bolus injection of echocontrast, 5.0 ml of 0.9% sodium chloride solution was additionally injected. During the study, the qualitative indicators were assessed, where the homogeneity / heterogeneity of contrasting, the symmetry / asymmetry of the accumulation of the contrast agent in the cortical and medullary layers, the homogeneity / heterogeneity of the washout of the echocontrast agent and the symmetry / asymmetry of the washout of the contrast agent were assessed. Also, these indicators were evaluated retrospectively in off-line mode, by means of photoanalysis of previously recorded video loops. At the end of the study, the quantitative indicators of CEUS were assessed by plotting intensity-time curves to assess the accumulation (wash-in) / wash-out of the contrast agent, with a detailed analysis of the onset of the arterial and venous phases. (Fig. 3.) Cortico-medullary (arterial) and parenchymal (venous) contrasting phases were analyzed. The obtained studies were compared in groups of patients receiving 2.5 or 1.0 ml of an echocontrast preparation.

Table 1

Distribution of patients in the clinical groups by age and sex

Groups	Total		Men		Women		Average age
	Abs.	%	Abs.	%	Abs.	%	
1	10	50,0	3	15	7	35	69±1,8
2	10	50,0	5	25	5	25	68±1,9
Total	20	100,0	8	40	12	60	64±3,4

Figure: 1. Ultrasound examination of the vessels of the right kidney, Color Doppler mode with moderate hypoperfusion (type - 3 on a five-point scale M. Bertolotto)

Results.

Qualitative indicators obtained from the results of CEUS of the kidneys in patients of the study groups with the use of 2.5 and 1.0 ml of a contrast agent are presented in table 1

Indicator	Group	
	1-st (n=10)	2-nd (n=10)
Times of arterial phase (sec)	9,4±2,1	12,3±3,5
Time to peak intensity (sec)	14,1±3,2	15,5±2,7
Peak intensity (sec)	91,1±3,8	94,2±2,3
Mean transit time (sec)	82,2±3,9	84,3±1,6

In patients of group 1 (n = 10) with type 2 diabetes and chronic pyelonephritis, who underwent CEUS in accordance with the European recommendations of 2017 (2.5 ml of an echocontrast drug intravenously). Using an improved technique (1.0 ml of an echocontrast drug intravenously in a stream) used in patients with type 2 diabetes and chronic pyelonephritis, belonging to group 2 (n = 10), the indicators were identical or slightly reduced.

Quantitative indicators obtained from the results of CEUS of the kidneys in patients of the study groups with the introduction of 2.5 and 1.0 ml of a contrast agent.

In patients of group 1 (n = 10) with type 2 diabetes and chronic pyelonephritis, who underwent CEUS in accordance with the European Guidelines for Clinical Practice on contrast-enhanced ultrasound imaging of 2017 the quantitative indicators correspond to the initial manifestations of angionephrosclerosis. Using the improved technique used in patients with type 2 diabetes belonging to group 2 (n = 10), the indicators were identical or slightly reduced.

Fig. 2A

Fig. 2B

Fig. 2. Comparative qualitative assessment of contrast-enhanced ultrasound examination of the kidneys with the use of 1.0 in a patient with CKD in the stage of subcompensation and 2.5 ml of an ultrasound contrast agent

Conclusion.

Thus, the improved CEUS technique with the use of 1.0 ml of an contrast agent showed good possibilities in the diagnosis of diabetic nephropathy in patients with type 2 diabetes and chronic pyelonephritis, comparable to the methodology of the European guidelines for clinical practice on contrast-enhanced ultrasound examination.

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Original and effective teaching

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Abstract

Teaching is the constant process in our life. It makes our parents, teachers/pedagogues at school or in the universities, mentors, experts, coaches, well-known academic, preachers and so on. The additional such factor maybe (and do indeed) Internat. Moreover, the common link among people is essentially exchanged as well. Many persons prefer have short conversation using SMS-communications, and it isn't face-to-face unfortunately. In any transport (metro, bus, trolleybus) a man seeks interesting or useful information but has not noticed persons' associates. It's not good. We can see the next negative situation at home in a family. For example: let's suppose that one student arrived home. Members of his family ask him about his routine business. And they usually here that everything is OK. Even during his eating, he tries to read the information which he sees in his mobile telephone or in the plane-table. Besides, he sends different short communications and gives answers. There are not any friendly dialogs with his family (father, mother, grandfather, grandmother, brother or sister). That's why in this article you can understand the new way how to exchange such negative situation in full.

Keywords: original lessons, teachings, contact in a family, common dialogs, common discussion.

Аннотация

Обучение – постоянный процесс нашей жизни. Им пользуются наши родители. Учителя/педагоги в школе или в университетах, наставники, эксперты, тренеры, известные академики, проповедники и др. Дополнительный фактор – интернет и общая связь между людей путём общения, смс-сообщений, но часто, к сожалению, дистанционно. В транспорте люди часто ищут информацию в мобильных устройствах, не обращая внимания на окружающих. Даже дома молодёжь почти не разговаривает с родителями или с родными. Статья показывает путь изменения такой негативной ситуации, объясняя возможный путь усиления общего диалога в семье.

Ключевые слова: оригинальные лекции, обучения, контакт в семье, общие диалоги, общие дискуссии.