CONTRAST-ENHANCED COMPUTED TOMOGRAPHY FOR THE DIAGNOSIS OF ABDOMINAL MASS LESIONS

Ibodova Dilnoza Fazliddinovna
Assistant Professor of the Department of Medical Radiology and Nuclear Medicine at the Abu Ali ibn Sino Bukhara State Medical Institute, https://orcid.org/0009-0003-9173-4316, dilnoza_ibodova@bsmi.uz

Annotatsion. In this article, contrast enhancement allows us to define the boundary between a pathological lesion and healthy tissue, as well as visualize feeding vessels and detect invasion of surrounding structures, which is especially important when planning surgical intervention. Focal nodular hyperplasia (FNH). Currently, due to the development and availability of imaging techniques, most FNH are incidental findings and rarely grow to a size that causes symptoms. FNH is the second most common benign liver tumor, most often occurring in healthy young and middle- aged women. FNH also occurs in men; it is often smaller in size and has an atypical appearance; in such cases, a needle biopsy is often required.

Key words: contrast enhancement, focal nodular hyperplasia, computed tomography, liver formation, fatty liver disease

КОНТРАСТНАЯ КОМПЬЮТЕРНАЯ ТОМОГРАФИЯ ДЛЯ ДИАГНОСТИКИ ОБЪЕМНЫХ ОБРАЗОВАНИЙ БРЮШНОЙ ПОЛОСТИ

Аннотация. В статья контрастное усиление позволяет определить границу между патологическим очагом и здоровой тканью, а также визуализировать питающие сосуды и выявить наличие инвазии в окружающие структуры, что особенно важно при планировании хирургического вмешательства. Фокальная нодулярная гиперплазия (ФНГ). В настоящее время в связи с развитием и доступностью методов лучевой диагностики большинство ФНГ случайные находки и редко вырастают до размеров, провоцирующих появление симптомов. ФНГ– второе по частоте доброкачественное образование печени, чаще оно встречается у здоровых женщин молодого исреднего возраста. Встречается ФНГ и у мужчин, часто она имеет меньший размер и нетипичный вид, в таких случаях нередко требуется пункционная биопсия образований.

Ключевые слова: контрастное усиление, фокальная нодулярная гиперплазия, компьютерных томографий, образование печени, жирового гепатоза печени

Relevance. Contrast-enhanced MSCT of the abdominal cavity is one of the most accurate and informative diagnostic X-ray techniques used to visualize the abdominal

and retroperitoneal organs. Multislice computed tomography with a contrast agent has significantly expanded the diagnostic capabilities of modern gastroenterology and other areas of medicine. The procedure involves administering a special iodine-containing agent to the patient, allowing for the rapid and accurate detection of pathological processes, damage to internal organs, and tumors. MSCT is characterized by high accuracy, information content, and safety. The share of contrast-enhanced CT (CE) scans, however, remains unchanged at 17–19% of all CT scans performed, which is significantly lower than in a number of other countries [1, 4]. Thus, in the USA, slightly more than half of CT scans (52.3%) are performed with contrast enhancement, while the share of abdominal CT examinations with contrast enhancement ranges from 56% (for kidney examinations) to 88% (for liver and pancreas examinations). Intravenous administration of contrast helps to determine the presence and structure of tumors, helps to identify even formations invisible with native CT, assess the presence of blood flow in them, the condition of other vessels, visualize pathological stenosis in vessels or their functional impairment. The contrast agent also has the property of accumulation in tumors, due to which CT with contrast is most often the last confirmatory examination before tumor biopsy. Due to other properties of contrast, it is possible to study the excretory function of the kidneys, evaluate the condition of the calyces and pelvis of both kidneys, trace the ureters along their entire length, to detect obstruction. [2,5]. Such a low proportion of CT scans with contrast agents (CA) performed in Russia can be explained not only by insufficient equipment and a shortage of contrast agents (CA) in healthcare facilities, but also by physicians' insufficient awareness of the risks and benefits of contrast studies. Physicians most often fear the development of anaphylactoid reactions during the examination; however, the incidence of severe and life-threatening reactions when using CA is only slightly higher (0.04% when using low-osmolal CA) than when administering local anesthesia in dental practice (0.008–0.03%) [3, 9]. Moreover, developed algorithms for premedication of patients with corticosteroids and antihistamines make it possible to minimize risks even when examining patients with a history of allergic reactions to iodine-containing CA. Another common concern is the risk of negative effects on renal function, the development of so-called contrast-induced nephropathy (CIN). According to recent large studies involving tens of thousands of patients and control groups of patients who did not receive iodine-containing steroids, the administration of iodine-containing steroids is not an independent risk factor for the development of CIN, while the existence of CIN as a separate phenomenon is questioned [7,11]. Even in patients with chronic kidney disease (CKD) with a low glomerular filtration rate, the administration of steroids does not cause an increase in mortality or the need for dialysis. The incidence of acute kidney injury after CT also does not depend on the use of steroids, and clinically, CIN cannot be distinguished from acute kidney injury that is not dependent on the

administration of steroids. The question of the possible the occurrence of CIN in patients with CKD stage IV–V, however, in any case, CIN is a much rarer phenomenon than previously thought [8,12,18]. Many doctors are concerned about the extravasation of CS during intravenous administration. However, with the correct technique of CS administration, extravasation is observed quite rarely (0.1–0.9% of cases) and even less often causes severe consequences (compartment syndrome) [13,17,20]. Fearing possible complications, many doctors stop their diagnostic search at the stage of non-contrast research This leads to a reduction in the diagnostic value of CT. The widespread use of this approach is evidenced by the catastrophically low number of CT scans with C-U performed in Russia.

Material and methods. The aim of our study was to evaluate the advantages of contrast-enhanced CT compared to non-contrast imaging in the differential diagnosis of space-occupying lesions in the liver, kidneys, and pancreas. A detailed diagnostic report is prepared within 2 hours. In the most complex cases, if additional specialists are needed, the scan results may take up to 24 hours to prepare. The patient will be notified of the report preparation time. The patient will receive a detailed diagnostic report and cross-sectional images on disk. These images can be emailed to the patient upon request. The results should be shared with the treating physician, who will review the information, evaluate any abnormalities or abnormalities, and make a diagnosis. A retrospective analysis included 55 individuals (25 women and 30 men; the average age in the overall group was 54.1 ± 13.8 years, the average age of women was 55.6± 13.9 years, and that of men was 53.5±13.8 years) with space-occupying lesions of the liver, kidneys, and pancreas who underwent examination and treatment. The exclusion criterion was the presence of severe fatty liver disease. In all cases included in the study, CT was performed on a multispiral computed tomography scanner Philips Brilliance CT 64 and Philips Brilliance CT 256. Standard scanning protocols adopted in the institution were used: slice width - 1.5 mm, reconstruction interval - 0.75 mm, pitch 0.8-1.1, tube rotation speed - 0.75 s. After native scanning, a study with an intravenous bolus was performed introduction non-ionic low osmosis Ultravist contrast agent with an iodine concentration of 300 or 370 mg iodine/ml was injected using a two-bulb automatic injector at a rate of 3–4 ml/s. There were no adverse reactions during the administration of the contrast agent. The dose of the contrast agent was calculated based on the patient's body weight (1.2 ml/kg), but not more than 100 ml. Immediately after the bolus of the contrast agent, 40–50 ml of saline solution was administered at a rate of 3–4 ml/s. Scanning was performed in the " bolus" mode. Bolus tracking (bolus tracking technique). The locator is positioned on the descending aorta 3–5 cm above the diaphragm, with a density threshold of 130–150 H units. The arterial phase is 10 s after reaching the density threshold, the venous phase is 40 s, and the delayed phase is 5–7 min after administration of the bolus. Two experienced radiologists with 7 and 32 years of experience, respectively,

were asked to conduct a blinded, independent assessment of the non-contrast native studies and to express their opinion on the presence of a lesion and its morphological nature. After this, they strictly evaluated the contrast phases of the studies and made their verdict, taking into account the characteristics of the contrast enhancement.

Of greatest interest is the differential diagnosis of renal cell carcinoma (RCC) and benign oncocytoma at the preoperative stage. Oncocytoma is the most frequently removed benign kidney tumor (4–10% of cases after nephrectomies performed due to suspected renal cell carcinoma). Differential diagnosis of renal neoplasms is based on the characteristics of their contrast enhancement in different phases, as these formations are virtually indistinguishable on native tomograms.

Conclusion. The study showed that the rate of false negative diagnoses, i.e., cases where the CT scan was completely useless, reaches 15% when using only non-contrast studies. Using CT with contrast enhancement in this study, it was possible to visualize all lesions and, in most cases, correctly assess their morphological nature at the preoperative stage. In detecting malignant neoplasms, the sensitivity and specificity the accuracy of CT with CU is 94.1 and 92.3%, respectively, while the accuracy of the method reaches 93.3%. Conducting CT with CU when there is a suspicion of neoplasms in the abdominal cavity and peritoneal space allows This not only allows for a more accurate and rapid diagnosis, but also reduces the number of tomography scans performed on the patient, as in most cases, a native-phase examination is followed by a repeat CT scan, which also includes native-phase imaging. Therefore, it can be concluded that the enormous potential benefit of CT with CU almost always outweighs the minimal risks associated with the introduction of CT.

Literature:

1. Tyurin I.E. Radiation diagnostics in the Russian Federation in 2014. Bulletin of Roentgenology and Radiology. 2015; 6: 56–63.

2. Stern SH Nationwide evaluation of X-ray trends. Tabulation and graphical summary of 2000 survey of computed tomography. August 2007; 174. Available at: http:// www.crcpd.org/Pubs/NEXT_docs/NEXT2000-CT.

3. ACR Committee on Drugs and Contrast Media. ACR Manual on Contrast Media – Version 10.1, 2015; 129. Available at: http:// www.acr.org/~/media/37D84428B F1D4E1B9A3A2918DA9E27A3.

4. Eskandari N., Nekourad M., Bas tan R. The awareness of anaphylax is reaction to local anesthesia in Dentistry. J. Allergy Asthma. 2014; 1:1–5.

5. McDonald RJ, McDonald JS, Carter RE Intravenous contrast material exposure is not an independent risk factor for dialysis or mortality. Radiology. 2014; 273(3):714–25.

6. Navarro AP, Gomez D., Lamb CM Focal nodular hyperplasia: A review of current indications for and outcomes of hepatic resection. H.P.B. 2014; 16:503–11. 7.

Baranes L., Chiaradia M., Pigne ur F. Imaging benign hepatocellular tumors: atypical forms and diag nostic traps. Diagn. Intervent. Imag. 2013; 94:677–95.

8. Bosman FT, Carneiro F., Hru ban RH, Theise ND WHO Clas sification of Tumors of the Digestive System (IARC WHO Classification of Tumors). 4th ed. 2010: 417.

9. Haoran Sun, Tianqiang Song. He patocellular carcinoma: Advances in diagnostic imaging. Drug Dis coversies & Therapeutics. 2015; 9 (5): 310–8.

10. Tumanova U.N., Yashina N.I., Karmazanovsky G.G. Diagnostic computer tomography ical criteria for hepatocellular laryngeal cancer of varying degrees of differentiation in the liver not affected by cirrhosis. Diagnosis tical and interventional work diology. 2015; 9 (1): 27–33.

11. Bajenaru N., Balaban V., Sa vules cu F. Hepatic hemangioma. J. Med. Life. 2015; 8, Special Issue: 4–11.

12. Huan-Yu Wang, Liang Zhang, Jian Wu. Adult hepatic cavernous hemangioma with highly elevated A-fetoprotein: A case report and review of the literature. Oncology Letters. 2015; 9: 637–40.

13. Xingmao Zhang, Zhixiang Zhou. Hepatic hemangioma masquerad

14. Zakharova OP, Kubyshkin VA, Karmazanovskiy GG The requirement ment for the CT-scan protocol for the proper assessment of pancreatic tumors resectability . Khirurgiya . 2012; 8: 44–50 (in Russian).

15. Kuzavleva EI Neuroendocrine pancreatic tumors – surgigal treatment and clinical and morphology cal prognostic factors. MD, PhD. sci. Diss. Moscow; 2015 (in Russian).

16. Zakharova OP, Karmazanovs kiy GG The possibilities of MDCT and other diagnostic modalities in pancreatic cancer staging and evaluation of the tumor extent: what do diagnostic mistakes effect on? Meditsinskaya visualization. 2012; 6: 51–6 (in Russian).

17. Makeeva -Malinovskaya N.Yu. Cont rast enhancement of solid tumors as a criterion for differential diagnosis of neuroendocrine pancreatic tu mors using multislice computed tomography. MD, PhD. sci. Diss. Moscow; 2014 (in Russian).

18. Eble JN, Sauter G, Epstein JI et al. WHO Classification of Tumors. Pathology and genetics of tumors of the urinary system and male genital organs. Lyon: IARC Press; 2004: 354.

19. Young JR, Margolis D, Sauk S et al. Clear cell renal carcinoma: Discri mination from other renal cell car cinoma subtypes and oncocytoma at multiphasic multidetector CT. Radiology. 2013; 267(2):444–53.

20. A Ren, Feng Cai, Yan-Ning Shang et al. Differentiation of renal onco cytoma and renal clear cell carcino ma using relative CT enhancement ratio. Chinese Med. J. 2015; 128, Is. 2: 175–9.