

## **OPPORTUNITIES OF COMPUTER TOMOGRAPHY IN DIAGNOSTICS OF URETEROLITHIASIS**

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### **ABSTRACT**

*The analysis of the results of examination of 40 patients with urolithiasis by the MSCT method was carried out. MSCT revealed a number of pathological changes accompanying ureterolithiasis and ureteral obstruction: pyelocalicoureterectasia, enlarged kidney, decreased densitometric parameters of the parenchyma, edema of perinephral and periureteral tissue, perinephral and periureteral tightness, fluid accumulation around the kidney and ureter. The severity of indirect signs of ureterolithiasis has a clear dependence on the duration of urinary tract obstruction.*

**Keywords:** *MSCT, urolithiasis, ureter, calculi.*

## **ВОЗМОЖНОСТИ КОМПЬЮТЕРНОЙ ТОМОГРАФИИ В ДИАГНОСТИКЕ УРЕТЕРОЛИТИЗА**

### **АННОТАЦИЯ**

*Проведен анализ результатов обследования 40 больных мочекаменной болезнью методом МСКТ. МСКТ выявил ряд патологических изменений, сопровождающих уретеролитиаз и обструкцию мочеточника: пиелокаликoureтерэктазия, увеличение почки, снижение денситометрических параметров паренхимы, отек перинефральной и периуретеральной ткани, перинефральная и периуретеральная герметичность, скопление жидкости вокруг почки и мочеточника. Выраженность косвенных признаков уретеролитиаза имеет четкую зависимость от продолжительности непроходимости мочевыводящих путей.*

**Ключевые слова:** *МСКТ, мочекаменная болезнь, мочеточник, камни.*

## **INTRODUCTION**

The recognition of ureterolithiasis and its complex, multifaceted manifestations, despite the advances in medicine in recent decades, remains an urgent clinical and diagnostic problem.

On the one hand, urolithiasis, which is a chronic multifactorial disease characterized by a violation of metabolic processes in the body, the development of local pathological changes in the organs of the urinary system with the formation of calculi in it, is widespread and has no tendency to decrease.

The incidence rate of urolithiasis in most developed countries has reached, according to WHO, 1-2%, has been called a folk or another disease of civilization. In the structure of urological patients, it ranks second after inflammatory nonspecific diseases of the kidneys and urinary tract. Patients with kidney and ureter calculi make up 20-40% of the entire contingent of urological hospitals, the number of patients is increasing, the most able-bodied part of the population is affected (most often, at the age of 30-55 years).

On the other hand, the use of the most widely used (overview and excretory urography, retrograde pyelography) and some new methods of radiation diagnostics (such as ultrasound, MRI, scintigraphy) of this disease often does not allow timely and accurate determination of the nature of the pathology, to differentiate it from other processes similar in clinical manifestations, which affects the results of patient treatment. Urolithiasis is one of the most common causes of death in urological patients.

The problem of detecting ureterolithiasis remains highly relevant. Patients with kidney and ureteral stones account for up to 40% of the entire contingent of urological hospitals, and their number is increasing. At the same time, the most able-bodied part of the population is affected.

**Purpose of the study:** the possibilities of computed tomography in the diagnosis of ureterolithiasis.

## **MATERIAL AND METHODS**

The work is based on the analysis of the results of the examination of 40 patients who were sent to the computed tomography department with suspected renal colic and who, as a result of a comprehensive radiation examination, revealed ureteral calculi. MCKT was performed on a PHILIPS Brilliance 16 spiral tomograph.

Men more often suffered from urolithiasis - 22 cases, which amounted to 55.0% of all patients, women were 18 (45.0%). The age group 20-40 years old accounts for 17 cases of renal colic, i.e., people of the most active age were sick.

## **RESEARCH RESULTS**

Stones in the right ureter were detected a little more often than in the left - 19 and 18 cases (47.5% and 45.0%). On both sides, stones in the ureters were detected in 3 patients (7.5%).

The most frequent complaints of patients were: pain in all 40 patients (100.0%), while the main localization of pain in the genitals and urethra was observed in 14 cases (35.0%), in the lower back in 16 cases (40.0%) ... Anamnestically acute onset of pain attacks was observed in 36 patients (90.0%), in 34 patients (85.0%), the onset of the disease was accompanied by vomiting. Complaints about frequent urination were presented by 17 people (42.5%). Almost every third patient complained of nausea and dry mouth (34 cases - 85.0%), 12 patients (30.0%) complained of chills. The most frequently determined: positive Pasternatsky's symptom - in 38 patients (95.0%).

The calculi found in observations were located: in 22.5% in the upper third (in the parochal region) of the ureters, in 25% in the middle third, in 52.5% in the lower third of the ureter.

Stones of any chemical composition had a density higher than 78 units. HU. The density of oxalates and phosphates is above 450 units. HU, and urates and cystine stones - below 450 units. HU.

Most often (67.5%) stones were fixed in the distal ureters. In the parochanochny department, calculi are detected in 20.0% of cases. The longest part of the ureter - from the level of the pelvic-ureteric segment to its lower third - accounted for only 7.5% of calculi.

The regularity of the size of the detected stones, depending on the localization in the ureter, was noted. The average size of calculi decreased along its course:  $0.9 \pm 0.5$  cm in the parochal region;  $0.6 \pm 0.4$  cm - in the middle third;  $0.4 \pm 0.3$  cm - in the juxtavesical section;  $0.4 \pm 0.2$  cm - at the orifice of the ureter.

All stones had a density significantly higher than the density of soft tissues. The detection of a stone in the lumen of the ureter at CT did not cause difficulties in most cases. In some cases, the presence of a "soft tissue rim" around the calculus, caused by edema of the walls of the ureter at this level, helped.

In addition to the direct sign of ureterolithiasis, CT scan revealed a number of indirect signs - pathological changes accompanying the obstruction of the upper urinary tract. The frequency of detection of these signs was analyzed depending on the CT examination and the onset of the clinical picture of renal colic (the appearance of a painful attack). The data are presented in Table 1.

Signs of urinary tract obstruction manifested themselves on tomography in the form of pyelectasis and ureteroectasias (92.5% and 95%, respectively). Signs Renal edema was identified as a thickening of the capsule and an indistinctness of the contours of the kidney 28%. Thickening of the walls of the pelvis was noted in 57%, and an increase in the kidney in 28% of cases; in 52% of cases, a decrease in the density of the renal parenchyma was verified (Fig. 1).

**Table 1.**

**The frequency of detection of secondary signs of upper urinary tract obstruction depending on the time from the CT scan**

	Signs	Examination time (hour)		
		1-4	4-14	Over 14
		Frequency of symptom detection (%)		
	<b>Signs of urinary tract obstruction</b>			
.1	Pyelocalicoectasia	75,0	87,5	92,5
.2	Ureteroectasia	82,5	95,0	97,0
	<b>Signs of kidney edema</b>			
.1	Thickening of the capsule indistinct contours of the kidney	0	20,0	27,5
.2	Thickening of the walls of the pelvis	22,5	45,0	57,5
.3	Kidney enlargement	7,5	25,0	27,5
.4	Decreased renal parenchyma density	27,5	42,5	52,5
	<b>Signs of perinephral, periruteral changes</b>			
.1	Perinephric severity	12,5	51,5	70,0
.2	Periureteral severity	5,0	47,5	60,0

.3	Perinephral fluid accumulation	0	10,0	12,5
.4	Periureteral fluid accumulation	0	7,5	7,5
.	<b>Local changes in the location of the calculus, swelling of the walls of the ureter</b>			
.1	The presence of a "soft-woven" rim around the stone	60,0	77,5	87,5

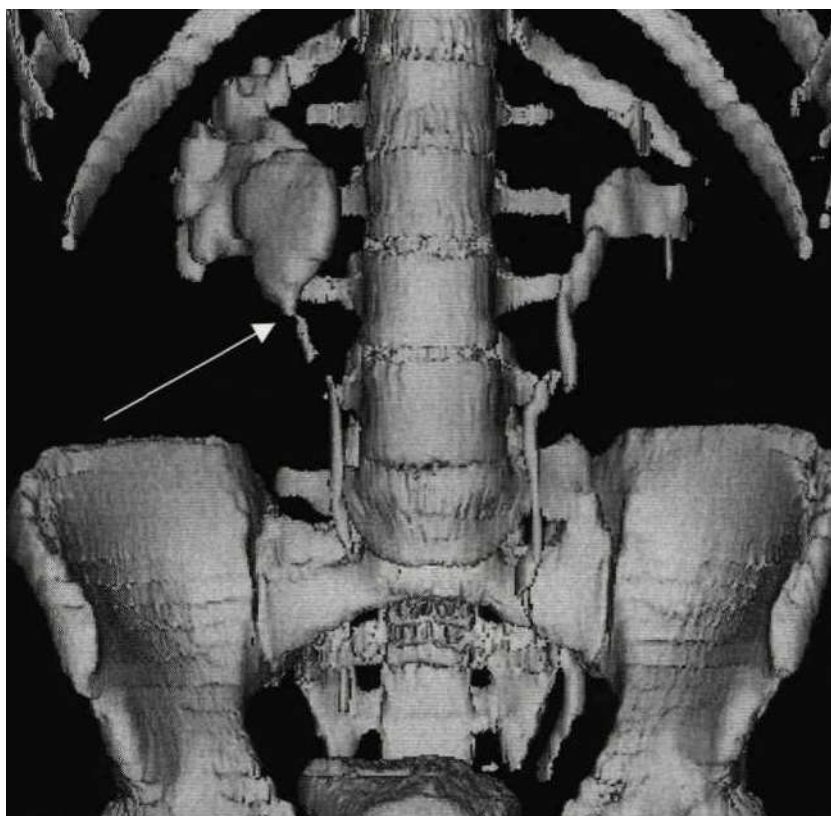


Figure 1. Three-dimensional reconstruction of the upper urinary tract of a patient with a vasorenal conflict on the right: expansion of the pyelocaliceal system of the right kidney and compression of the right ureter below the pelvic ureteric segment is determined

Signs of perinephral, periureteral changes were also typical in ureterolithiasis. So, perinephral severity was ascertained in 70%, periureteral severity - 60%. Perinephral and peniureteral fluid accumulation was characteristic in 12%.

Local changes in the location of the calculus, edema of the walls of the ureter manifested as the presence of a "soft tissue" rim around the stone was visualized in the majority of observations (87%).

Ureteroectasia was the most common symptom of ureterolithiasis - it was detected in 38 patients (95.0%). At the same time, in the first 4 hours, it was determined in 82.5% of patients, during the next 10 hours - in 95.0%, over 14 hours - in 97.5% of patients. At the same time, the width of the lumen was almost the same throughout and amounted to 0.4-1.5 cm. The degree of ureteral dilatation in most cases (90.0%) was proportional to the expansion of the renal CLS and had a dependence on the size of the calculus, correlating with the severity of the clinical picture. renal colic. In 2 cases, the degree of PCS dilatation was less than the degree of ureteral dilatation.

As you can see, this technique allows you to identify a number of pathological changes accompanying ureterolithiasis and ureteral obstruction: pyelocalicoureteroectasia, enlargement of the kidney, decreased densitometric parameters of the parenchyma, edema of the perinephral and periureteral tissue, perinephral and periureteral tightness, and fluid accumulation around the kidney.

## **CONCLUSIONS**

X-ray computed tomography is an effective radiation method for diagnosing ureterolithiasis, which allows one to identify a number of pathological changes accompanying ureteral obstruction. The severity of indirect signs of ureterolithiasis has a clear dependence on the duration of urinary tract obstruction.

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