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Factors Leading to Urolithiasis in Patients with Metabolic Syndrome

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Abstract

This article analyzes the problem of urolithiasis disease (UD) which is one of most relevant in cotemporary urology and medicine in general. This is sacred first of all, with high prevalence of this diseases. According to several population studies, dissemination the strangeness of urolithiasis in world ranges from 3.5 to 9.6% [1]. At this, the proportion of urolithiasis among all urological diseases reaches 40% [2]. Relevance of this problem is also due to the fact that in 65–70% cases the disease is diagnosed in persons aged 20–60 years, that is, in the most active working age period of life. In addition, in 35 – 38% cases, the disease is recurrent general character, therefore of special significance from a medical and economic point of view long-term vision gains terms of rehabilitation and loss of employment abilities of these patients.

Keywords: metabolic syndrome, urolithiasis, abdominal obesity, arterial hypertension, hyperglycemia, diabetes mellitus type 2, hyperinsulinemia, insulin resistance.

Problem of urolithiasis disease (UD) at present time is one of most relevant in co-temporary urology and medicine in general. This is sacred first of all, with high prevalence of this diseases. According to several population studies, dissemination the strangeness of urolithiasis in world ranges from 3.5 to 9.6% [1]. At this, the proportion of urolithiasis among all urological diseases reaches 40% [2]. Relevance of this problem is also due to the fact that in 65–70% cases the disease is diagnosed in persons aged 20–60 years, that is, in the most active working age period of life. In addition, in 35 – 38% cases, the disease is recurrent general character, therefore of special significance from a medical and economic point of view long-term vision gains terms of rehabilitation and loss of employment abilities of these patients [3].

Over the past 10 years in in many countries it is increasingly observed upward trend in incidence urolithiasis. Published American results in 2003 Kan population research health and nutrition status (NHANS III) demonstrate significant increase in widespread severity of UD in the US adult population.

A unified concept of etiopathology without urolithiasis so far pores do not exist. Development of the disease is associated with a number of complex physical chemical processes occurring active both in the body as a whole and in the kidney and urinary tract in particular [6]. The emergence of new alternative methods of treating stones several kidneys and ureters decreased interest in studying the etiology, pathogenesis and conservative treatment of urolithiasis [7]. Over the course of a long time the

traditional approach to treatment of UD was determined by the development of technical techniques of surgical interventions and work of new removal technologies stone, which by now has willed almost completely to refuse to escape from open operating rooms interventions on the kidney for this diseases. The need exists improvement and improvement is not enough invasive endoscopic methods the stone is not removed , but this does not eliminate the patient on the possibility of the appearance new stones, since the reasons stone formation is usually not are eliminated. Currently, there has been a renewed interest in research in the field of etiology and pathogenesis of UD, since only on OS- new knowledge of the etiopathogenesis of the possibility it is possible to develop optimal methods of conservative treatment and disease prevention.

It was relatively recently for the first time attention was paid to mutual relationship between ICD and metabolic syndrome (MS). Published in May results of a study co- Health and Nutrition Assessment (NHANS), conducted in the USA from 1988 to 1994 and covered 8814 men and women demonstrated close correlation between MS and cases urolithiasis. Availability of one temporarily 4 or more MS components, diagnosed according to the criteria riyam of the National Educational Cholesterol Programs (NCEP), increases the risk of developing ICD when approximately 2 times [8]. Individual components MS nents, such as abdominal obesity, arterial hypertension (AH), hyperglycemia and sugar diabetes (DM) type 2 independently correlated are at increased risk of nephrolithiasis [8].

Metabolic syndrome is pathological symptom complex, including various metabolic cultural and hormonal disorders. Co-according to the diagnostic model, prelaid down by the International Federation tion of Diabetes (International Diabetes Federation) in 2005 [9], diagnosis of MS exhibited in the presence of abdominal national obesity (which is defined varies with waist circumference (WC) at men ≥ 94 cm and women ≥ 80 cm)

And at least two of the following: factors:

• increased triglyceride levels ≥ 150 mg/dL (1.7 mmol/L) or normal
high level of triglycerides with taking appropriate therapy;

• arterial hypertension (BP ≥ 130/85 mm Hg) or normal blood pressure,
controlled by antihypertensive drugs parathas;

• increased plasma glucose levels ≥ 100 mg/dL (5.6 mmol/L) or presence
previously diagnosed diabetes.

Prevalence of metabolic syndrome in the general population quite high and, according to data, research, ranges from 14 to 39% [10]. Number of patients with MS with increases every year.

Most often in patients with MS urinary stones are detected main tract, consisting of uric acid lots [12]. In the study by Pak C.Y. And in patients with diabetes mellitus volume 2 type frequency of occurrence of urate- nephrolithiasis was 6 times higher, than in patients from the general population
[13]. A higher race was reported extent of MS components, such as obesity, type 2 diabetes, Improving glucose tolerance (IGT) and hypertriglyceridemia in patients with uric acid urolithiasis [14-16]. By according to the study by Losito A. et al. Hypertension was also an independent factor risk of formation of uric acid [17]. At the same time, according to Taylor E.N. et al., in patients with hypertension with an increase in body mass index (BMI) concentration increased and excretion of uric acid [18]. According to various studies, at the basis of the formation There are three types of uric acid stones: pathophysiological mechanism:

1) sharply acidic urine pH; 2) low dicut associated with insufficient co-quantity of liquid consumed;
3) hyperuricosuria [19-21]. Wherein high acidity of urine (pH ≤ 5.5) considered the most important pathogenetic factor. It is known that in sharply acidic environment solubility uric acid levels drop. Weakness- Roman uric acid crystallizes is found in the urinary tract and is converted into urinary stones [22].

For the first time, the connection between high acidity of urine and the risk of forming the study of uric acid stones has been described san about 40 years ago [23]. However, about reliable laboratory and clinical connection between low pH urine and MS became known regarding just recently. Assumed role insulin resistance and hyperinsulinemia (the main links in the pathogenesis MS) in increased acidity of urine and the formation of uric acid stones [24, 25].

Two reasons are described for having increased acidity of urine. These include violations reducing the excretion of ammonium ion (NH4+) and excessive excretion of acids (net acid excretion – NAE) [20, 21]. Normally acidic urine alkaline balance is maintained lives a highly productive ammonium buffer system. At excess acids, ammonia (NH3), releases produced by renal tubular cells, combines with hydrogen ions (H+) in renal tubules, forming am-ion monium (NH4+). Some researchers researchers showed a decrease ammonium excretion in patients with MS [25, 26]. For the first time, the connection between insulin-resistance, urine pH and ammoniogenesis has been demonstrated when using hyperinsulinemic chelic euglycemic clamp test in patients with uric acid urolithiasis [24]. These studies showed potential role of insulin resistance stenting in violation of excretion ammonium ion (NH4+) and thus , lowering the pH of urine. It is known that insulin receptors are presented in various parts of the nephron [27, 28].

In animal studies, Delhi (rats, dogs) insulin showed itself as a stimulator of renal ammoniogenesis [29, 30]. Respectively, in insulin resistant state the stimulating effect is disrupted insulin in relation to synthesis and excreation of NH4+. Another mechanism in addition to disrupting the functioning of ammonium buffer, promoting increased reducing the acidity of urine is excess acid excretion (NAE).

According to a study by Maalouf N.M. et al., in patients with MS it was noted significantly higher excretion acids compared to control group [25]. It is known that excess high acid excretion (NAE) may be as a consequence of excessive emphasis consumption of foods with acidic low pH and low consumption alkaline products and endogenous hyperproduction of acid valentties [20]. When comparing patients with uric acid urolithiasis with controle group (without urolithiasis) ex-acid cretion was significantly higher in the first group [31]. In this study when both groups of patients received equal in acidity nutrition, which made it possible to exclude influence of food intake on excretion of acids and assume enpregenic hyperexcretion of acids in patients with urate stones. IN in their research Sakhaee K. and al. suggested that increased endogenous acid excretion (NAE) and impaired NH4+ excretion in patients with urate nephrolithiasis diseases may be associated with insulin- resistance and development of type 2 diabetes [22]. However, acid disturbance urine was detected in both patients with hyperinsulinemia and UD and in patients without UD with presence of hyperinsulinemia. So the question remains open why do some patients with MS and increased hyperinsulinemia acidity of urine leads to removal of stones in the urinary tract ways, and in other patients, with under similar conditions, UD does not develop

In addition to uric acid concrements in patients with MS occur also stones with alternative chemicals composition. Most often this stones made of calcium oxalate or mixed stones (uric acid/ calcium oxalate). Urine crystals acids with which it is oversaturated acidic urine of patients with MS may serve as nucleation centers for epitaxial crystal growth calcium oxalate [16, 32]. In research study conducted by Cupisti A. and al., which studied the influence insulin resistance on the composition urine in patients with calcium deficiency stones, a relationship was found between MS components and risk calcium nephrolithiasis [33]. IN In this study, the level of insulin but resistance (defined using the HOMA index) about- correlated with excretion citrate (the main solubilized ra of urine, preventing the formation of calcium oxalate stones her). The study is also interesting DeFronzo R.A. et al., who at examination of healthy young adults Rovoltsev using euglycemic hyperinsulinemic clamp test showed that hyperinsulinemia increases calcium excretion from urine by about 60% without any changes in its

concentration in plasma or glomerular filter speed. Several studies report the presence of a positive correlations between BMI and excrement of calcium and oxalates and negative body - between BMI and excretion citrate [18, 35-37]. When retrospective positive data analysis, semi- during the examination of 109 people eyelids without ICD and 128 patients with calcium-oxalate nephrolithiasis, it was shown that in the first group subjects calcium excretion was higher in persons with MS and increased increased as the component Commodity MS (with 3.6 ± 1.8 mmol/day at absence of MS up to 6.0 ± 2.9 mmol/day in persons who simultaneously have 4

MS component, p = 0.0003). In patients ents from the second group (with calcium- oxalate nephrolithiasis) risk factors for the formation of stones (hypercalciuria, hyperoxaLaturia) were more pronounced degrees, but at the same time were not related associated with the presence or absence of MS and the degree of its severity [38].

Data from most studies tions indicate a greater diversity prevalence of MS among men European population (approximately 15% of men over 40 years old) [39, 40]. Thus, in the DECODE study, when involving 4,715 men and 5,554 women, the prevalence of MS was assessed according to 4 proposed definitions MS: WHO, National Education Vocation Program for Cholesterin (NCEP, ATP-III), Revision Recommendations of the National Education Votive Program on Cholesterin (NCEP, ATPIII-R) and International native Diabetes Federation (IDF). According to the proposed definitions niyam, MS was identified in 27.0%, 25.9%, 32.2% and 35.9% of men and 19.7%, 23.4%, 28.5% and 34.1% women respectively [41].

In the USA recently there have been there is a tendency towards leveling gender difference in occurrence MS, however, this is due, firstly turn, with a high prevalence the prevalence of MCs among female Latina American population [10]. EuroPei's tendency to predominate MS remains in the male population former.

Undoubtedly, the clinical sign MS is more serious in men,than women. This is not due only more widespread MS, but also greater malignancy ity" of MS in men. So, abdominal type of obesity, which is considered the most unfavorable clear and is the main diagnostic criterion of MS, characteristic specifically for men (male type of adipose tissue distribution) [42]. Bjorntorp P. and Kissebah A.H. c al. showed that for the same BMI indicator abdominal obesity is accompanied by higher risk of developing concomitant diseases than peripherical obesity [43, 44]. Exactly therefore the severity of the consequences and complications of obesity is higher in men compared to with women. According to some researchers, dependence complications of obesity from distribution fat loss is more pronounced than dependence on the degree of obesity [45, 46]. That's why some researchers talk about the fundamental the role of MS in men, in unlike women, as pre- speaker of cardiovascular mortality [39, 47, 48]. ICD, as well as MS, more widespread in the male population. According to epidemiological data scientific research conducted in The USA in recent years, among all patients suffering from urolithiasis no disease, for the share of men accounts for 62% [49, 50]. Similar the data were obtained from the study introduction of the main types of ICD in Moscow region. Moreover, among men there is an increasing trend incidence of ICD. Yes, percentage men suffering from urolithiasis increased from 52.2% in the period from 1990 to 2000 up to 57.2% (from 2005 to 2009) [51]. Considering the presence of correlation between MS and the risk of ICD, as well as high prevalence and co-the social significance of these diseases research, study of risk factors for ICD in patients with MS represents constitutes an important interdisciplinary task in order to develop a profilactic measures aimed at dedicated to preventing the development UD and its metaphylaxis. Due to with a higher prevalence almost all components MS in the male population seems most relevant significant study of various factors lithogenesis specifically in male patients with metabolic syndrome.

Reference

1. Curhan G, Goldfarb D, A. T. "Epidemiology of Stone Disease". 2nd International Consultation on Stone Disease // 2007. No. 9. R. 11-20.
2. Apolikhin O.I., Sivkov A.V., Beshliev D.A., Solntseva T.V., Komarova V.A. Analysis of uronephrological morbidity in the Russian Federation according to according to official statistics // Experimental and clinical research logy. 2010. No. 1. pp. 4 - 11.
3. Dzeranov N.K., Lopatkin N.A. Urolithiasis disease. Clinical recommendations. // M.: Ovreley, 2007. P.296.
4. Stamatelou KK, Francis ME, Jones CA, Nyberg LM, Curhan GC. Time trends in reported prevalence of kidney stones in the United States: 1976-1994. // Kidney Int. 2003. No. 5. R. 1817-23.
5. Lopatkin N.A., Dzeranov N.K. Fifteen years of experience in using DLT in the treatment of urolithiasis // Materials of the Plenum of the Board of the Russian Urology Society M. 2003. S. 5 – 25.
6. Borisov V.V., Dzeranov N.K. Conservative lithokinetic therapy kidney and ureteral stones. // M.: Ovreley, 2006. P. 56.
7. Tatevosyan A.S. Etiological and pathogenetic basis of nephrolithiasis. // Krasnodar: Soviet Kuban, 1997. 150 p.
8. West B, Luke A, Durazo-Arvizu RA, Cao G, Shoham D, Kramer H. Metabolic syndrome and self-reported history of kidney stones: the National Health and Nutrition Examination Survey (NHANES III) 1988-1994. // Am J Kidney Dis. 2008. No. 5. R. 741-7.
9. Alberti KG, Zimmet P, Shaw J Metabolic syndrome—a new world-wide definition. A Consensus Statement from the International Diabetes Federation. // Diabet Med. 2006. No. 5. R. 469-80.