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## Frequency of Occurrence and Clinical Picture of Urolithiasis on the Background of Benign Prostatic Hyperplasia

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*The purpose of the study* was to identify the frequency of occurrence of urolithiasis against the background of benign prostatic hyperplasia, to find out whether the presence of benign prostatic hyperplasia in a patient affects the frequency of occurrence of urolithiasis, to study the clinical picture to understand whether there is some general or specific clinical picture or some feature inherent in the clinic when occurrence of urolithiasis and benign prostatic hyperplasia are accompanying each other.

*Materials and methods.* The clinical data of 152 patients aged over 45 years who underwent examination and treatment in 2005-2015 at the A. Aliyev Azerbaijan State Institute of Advanced Medical Training and at the Shirvan Medical Diagnostic Center in 2008-2015 were analyzed.

Against the background of benign prostatic hyperplasia, 85 (55.92%) patients had upper urinary tract stones. Of these, 52 (34.21%) had kidney stones, and 33 (21.71%) had ureteral stones. Bilateral nephrolithiasis was detected in 16 (10.5%) patients, unilateral – in 36 (23.68%), bilateral ureterolithiasis – in 2 (1.32%), unilateral – in 31 (20.39%) patients. Of 152 patients, bladder stones were detected in 112 (73.4%) patients. The bulk of the examined patients were patients who had bladder stones on the background of benign prostatic hyperplasia. Of these 112 patients, 25 (16.45%) had kidney stones along with cystolithiasis, one (0.89%) had left-sided ureterolithiasis, and one (0.89%) had bilateral nephrolithiasis and left-sided ureterolithiasis.

To characterize the clinical signs of infravesical obstruction in benign prostatic hyperplasia, the Guyon classification was applied. Most of the patients – 102 (67.12%) patients according to this classification were at the II stage of benign prostatic hyperplasia. The number of patients at stage I was 29 (19.08%), and at stage III – 21 (13.82%).

*Results and discussion.* In this study in patients over 45 years, nephrolithiasis on the background of benign prostatic hyperplasia was detected in 34.21% of cases, ureterolithiasis on the background of benign prostatic hyperplasia – in 21.71% of cases, cystolithiasis on the background of benign prostatic hyperplasia – in 73.4% of cases, and cystolithiasis and upper urinary stones on the background of benign prostatic hyperplasia – in 17.8% of cases. As can be seen from the data presented, the bulk of the examined patients

were patients who had bladder stones on the background of benign prostatic hyperplasia.

*Conclusion.* The presence of bladder outlet obstruction and the aggravation of the stage of benign prostatic hyperplasia increase the incidence of cystolithiasis and aggravate the clinical picture of urolithiasis, leading to its complications. At the same time, the presence of concomitant urolithiasis aggravates the clinical picture of benign prostatic hyperplasia, that is, there is a syndrome of mutual weighing of clinical symptoms. There is no general and specific clinical picture in the clinic. There are the same signs and complications that are inherent in both pathologies. Therefore, there is a need for a deeper study of such patients for the correct diagnosis and choice of a rational method of treatment.

**Keywords:** urolithiasis, benign prostatic hyperplasia, infravesical obstruction, dysuria, renal colic, lower urinary tract symptom.

**Introduction.** Urolithiasis (URL) is a metabolic disease that occurs under the influence of endogenous and exogenous factors, characterized by the formation of stones in the urinary tract. URL is the 3<sup>rd</sup> most common urological disease after urinary tract infections and prostate diseases and occurs in 3–4 percent of the world's population [1-4]. In Azerbaijan, this indicator in terms of prevalence among the population is 1.4% and in certain areas (Ganja, Sheki, Lankaran) is endemic [5, 6]. 30–45% of patients in urological departments are patients with urolithiasis [7]. URL is progressing every year. According to scientists' forecasts, unfavorable environmental and social factors, changes in the nature of nutrition, overweight and in the future will provoke an increase in this disease. For example, in Germany, the percentage of this disease increased from 4.0% to 4.7% from 1979 to 2001 [8, 9]. Among the world's population, urolithiasis occurs three times more often in men than in women, but in Azerbaijan this disease is more common among women [5, 9]. Recently, there has been a tendency for the growth of this disease among elderly and senile patients. Therefore, elderly and senile people are also at risk of URL [8-11]. According to the classification of the World Health Organization (WHO), the age of 60–74 years is considered elderly, 75–89 years – senile, 90 and above – centenarians. Due to the smallest number of publications in the literature on URL

among age-related patients, it is necessary to study this pathology in this age group.

Among the diseases of the genitourinary system in elderly and senile men, benign prostatic hyperplasia (BPH) is most common [12]. The increase in life expectancy, the aging of the human population as a whole has caused an increase in the number of patients with BPH and the annual incidence rate. The number of patients and the annual incidence rate are linearly related to the age of the patient [4]. For example, in men over the age of 50, BPH is detected in 50% of cases, and in men under 90 – 88% of cases [12]. Patients with BPH with clinically significant symptoms requiring treatment in men aged 50–59 years occur in 17% of cases, at the age of 60–69 years – 27% of cases, and at the age of 70–79 years – 35% of cases [12].

According to different authors, the frequency of simultaneous occurrence of URL and BPH in urological patients is 3–47% [3, 13, 14]. According to some authors, the frequency of simultaneous occurrence of BPH with nephrolithiasis is 1.3–4%, with ureterolithiasis – 0.5–4.5%, and with cystolithiasis – 5.5–72.2% [3, 4, 12-15].

With URL, depending on its duration, the time of treatment with a urologist, the size, structure, quantity and location of the stone, the presence of concomitant pyelonephritis, the degree of its manifestation and the degree of urodynamic disorders, a wide variety of clinical signs are observed [16]. URL is understood as: nephrolithiasis, ureterolithiasis, cystolithiasis and urethralithiasis. The most common form of URL is nephrolithiasis [4, 16].

The main clinical signs of urolithiasis of the upper urinary tract are pain, hematuria, dysuria, free discharge of stones and salt crystals. But in addition to the last indicated sign, the other above-mentioned clinical signs are not pathognomic for urolithiasis and may occur in other urological diseases [8, 16]. One of the permanent signs of URL is renal colic. It is characterized by pain in the lumbar region radiating into the hypochondrium, along the ureter to the scrotum and penis [3, 8, 16]. Renal colic in the early stages of urolithiasis, accompanied from time to time by an increase in body temperature with chills, is a consequence of the addition of pyelonephritis, which occurs against the background of increased intracranial pressure due to blockage of the urinary tract with a stone and the occurrence of pelvic-renal reflux [8, 16].

BPH is clinically characterized by lower urinary tract symptoms (LUTS). The SNMP includes irritative and obstructive signs. The irritative signs include frequent, painful urination, nocturia, imperative urge to urinate, urination in small portions and urinary incontinence with urge. Obstructive signs are sluggish urine stream, difficulty urinating, feeling of incomplete emptying of the bladder, paradoxical ischuria. Irritative and

obstructive signs can be observed both together and separately [17].

A review of the scientific literature shows that information on the frequency of occurrence of URL against the background of BPH, the presence of a pathogenetic relationship between these pathologies, a description of the clinical picture of infravesical obstruction and urolithiasis when these pathologies are associated with each other is very scarce.

**The purpose of the study** was to identify the frequency of occurrence of URL against the background of BPH, to find out whether the presence of BPH in a patient affects the frequency of occurrence of URL, to study the clinical picture to understand whether there is some general or specific clinical picture or some feature inherent in the clinic when URL and BPH accompany each other.

**Materials and methods.** The clinical data of 152 patients aged over 45 years who underwent examination and treatment in 2005–2015 at the A. Aliyev Azerbaijan State Institute of Advanced Medical Training and at the Shirvan Medical Diagnostic Center in 2008–2015 were analyzed.

All experiments were conducted in accordance with the Council of Europe Convention “On the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine Application of Biological and Medicine Achievements (ETS No. 164)” dated 04.04.1997, and the Helsinki Declaration of the World Medical Association (2008). Each study patient signed an informed consent to participate in the study and all measures to ensure anonymity of patients were taken.

The average age index was 66.26 years (age between 45–87 years). The distribution of patients by age category is shown in **Table 1**.

**Table 1** – Number of patients by age group

Age groups	45–59 years	60–74 years	75–80 years	81–87 years
Number of patients	33	86	27	6
%	21.71%	56.58%	17.76%	3.94%

As can be seen from **Table 1**, most of the subjects – 86 (56.58%) of the total number were patients aged 60–74 years. The minimum number of patients was in the age group of 81–87 years – 6 (3.94%) and such a small number of subjects in this age group is explained by the fact that in Azerbaijan fewer men live up to this age.

Examination of 152 patients with BPH revealed stones of the upper urinary tract in 85 (55.92%) patients. Of these, 52 (34.21%) had kidney stones, and 33 (21.71%) had ureteral stones. Bilateral nephrolithiasis was detected in 16 (10.5%) patients, unilateral –

in 36 (23.68%), bilateral ureterolithiasis – in 2 (1.32%), unilateral – in 31 (20.39%) patients. Of 152 patients, bladder stones were detected in 112 (73.4%). As can be seen from the data presented, the bulk of the examined patients were patients who had bladder stones on the background of BPH. Of these 112 patients, 25 (16.45%) had kidney stones along with cystolithiasis, one (0.89%) had left-sided ureterolithiasis, and one (0.89%) had bilateral nephrolithiasis and left-sided ureterolithiasis.

To characterize the clinical signs of infravesical obstruction in BPH, we applied the Guyon classification. Most of the patients – 102 (67.12%) patients according to this classification were at the II stage of BPH. The number of patients at stage I was 29 (19.08%), and at stage III – 21 (13.82%) (Table 2).

**Statistical research.** In the course of the study, the numerical indicators obtained were subjected to statistical processing. Statistical analysis was carried out by discriminant correlation methods.

**Results and discussion.** When conducting this study, we took into account many data including rectal examination data, ultrasound, CT, MRI, overview, excretory urography, blood PSA indicators, IPPS, Qmax and general urinalysis indicators, but at the same time analyzed the anamnesis data in detail to understand whether there is any general or specific clinical picture or some feature inherent in the clinic when URL and BPH accompany each other (Table 3).

In their anamnesis, 35 (23.03%) patients noted renal colic. Of these, 21 (13.82%) patients after renal colic observed free discharge of the stone. Free discharge of stones is one of the pathognomic symptoms of URL. It was also observed in this cases. However, the elimination of stones in patients with BPH due to infravesical obstruction is difficult in most cases. Of 35 patients with renal colic, 14 (9.2%) had bladder stones in the subsequent period. The reason for this, as already noted above, is the infravesical obstruction observed in patients with BPH. Infravesical obstruction creates an obstacle to free discharge of stones from the bladder. In such patients, stones migrating into the bladder from the upper urinary tract with severe obstruction settle here and can increase to large sizes. The reason for the increase in the size of such

secondary stones in the bladder is the occurrence of secondary pseudodiverticles here, which become foci of chronic infection, which supports sluggish chronic cystitis here [2, 13, 16]. Pain in the bladder area was detected in 6 (3.95%) patients.

With exacerbation of chronic pyelonephritis: an increase in body temperature in the anamnesis was noted by 8 (5.26%) patients, pain in the lumbar region – by 98 (64.47%) patients, and macrohematuria – 12 (7.89%). BPH is clinically characterized by SNMP (Table 4). Irritative and obstructive signs belong to SNMP [17].

**Table 2** – Distribution of patients taking into account the stages of BPH, location and size of stones

Location of the stone	Stages of BPH			The size of the stones
	I	II	III	
Kidney stones	6	2	1	3–51 mm
Ureteral stones	11	3		5–14 mm
Bladder Stones		68	17	6–70 mm
Kidney stone, Bladder stone		22	3	Kidney stone: 2–13 mm; Bladder stone: 5–35 mm
Kidney stone, Ureter stone	12	5		Kidney stone: 3–22 mm; Ureter stone: 5–19 mm
Ureter stone, Bladder stone		1		Ureter stone: 9 mm; Bladder stone: 16–18 mm
Kidney stone, Ureter stone, Bladder stone		1		Kidney stone: 8–16 mm; Ureter stone: 10–13 mm; Bladder stone: 5–10 mm
Number of patients	29 (11.25%)	102 (63.75%)	21 (25%)	
	IN TOTAL: 152			

**Table 3** – Clinical symptoms of urolithiasis in patients with BPH

Symptoms	Number of patients	Percentage indicator, %
Free passage of the stone (in the anamnesis)	21	13.82
Renal colic (in the anamnesis)	35	23.03
Increased body temperature (in the anamnesis)	8	5.26
Acute urinary retention (history)	31	20.39
Difficulty urinating (history)	49	32.24
Dysuric signs	89	58.55
Feeling of incomplete emptying of the bladder	5	3.29
Lower back pain	98	64.47
Pain in the bladder area	6	3.95
Macrohematuria (in anamnesis)	12	7.89

**Table 4** – Distribution of patients with SNMP

Symptoms	Number of patients (%)
Only irritative	29 (19.08%)
Only obstructive	21 (13.82%)
Irritative + Obstructive (aggregate)	102 (67.11%)
Total :	152 (100%)

In this study, only irritative symptoms were observed in 29 (19.08%) patients, only obstructive – in 21 (13.82%), and in total – in 102 (67.11%) patients. Together, these symptoms were observed in 102 (67.11%) patients with cystolithiasis and BPH in stage II. Based on the data obtained, we came to the conclusion that the weighing of the BPH stage increases the number of patients with cystolithiasis and at the same time the presence of concomitant cystolithiasis makes the clinical picture of BPH heavier. Therefore, we believe that dysuric symptoms in patients with BPH and cystolithiasis are caused not only by SNMP, but also by irritation of the bladder neck with a stone or stones, as well as due to the presence of concomitant chronic cystitis, which always accompanies cystolithiasis.

It is well known that in BPH due to infravesical obstruction and intravesical growth of adenomatous nodes (intratrigonal growth) due to mechanical compression of the ureteral mouths, urodynamics of the upper urinary tract is impaired [7, 14]. And the presence of the accompanying urolithiasis also makes this process more difficult. Because due to the presence of nephrolithiasis or ureterolithiasis in all these patients, the urodynamics of the upper urinary tract is more or less impaired [7]. The addition of inflammatory complications to these processes can further aggravate the general condition, and with this situation in clinical symptoms, the signs inherent in the inflammatory process come out in the first place. Many inflammatory complications, especially cystitis and pyelonephritis, occur against the background of the development of urodynamic disorders and very often turn into a chronic form. Increasing dilatation of the upper urinary tract and chronic infection can lead to chronic renal failure (CRF), up to uremia [3].

In this study, signs of CRF were detected in 2 (1.32%) patients. In patients over 45 years, nephrolithiasis on the background of BPH was detected in 34.21% of cases, ureterolithiasis on the background of BPH – in 21.71% of cases, cystolithiasis on the background of BPH – in 73.4% of cases, and cystolithiasis and upper urinary stones on the background of BPH – in 17.8% of cases. The above information is reflected in **Table 2**. As can be seen from the data presented, the bulk of the examined patients were

patients who had bladder stones against the background of BPH. According to the data obtained, we came to the conclusion that infravesical obstruction in BPH is one of the causes of primary bladder stones, and also by preventing the elimination of secondary stones contributes to the subsidence and increase of these stones in the bladder.

In patients with URL on the background of BPH in the clinical picture, pain in the lumbar region was detected in 64.47% of cases, pain in the bladder – in 3.95% of cases, macrohematuria – in 7.89% of cases, fever – in 5.26% of cases, obstructive symptoms – in 13.82% of cases, irritative symptoms – in 19.08% of cases, both obstructive and irritative symptoms – in 67.11% of cases. The above information is reflected in **Tables 3 and 4**.

In most cases, clinical symptoms manifested themselves as complications of urolithiasis and infravesical obstruction. For example, in 63 (41.4%) patients, dull pain in the lumbar region in most cases was associated with the degree of urodynamic disorders of the upper urinary tract, chronic pyelonephritis and stones of the upper urinary tract. The study and analysis of clinical symptoms in patients with URL on the background of BPH showed that when these pathologies co-exist with each other, there is no general and specific clinical picture. The clinical picture of URL in such patients also depends on the time of the onset of the disease, on the size and location of the stone and on the presence or absence of complications. There are the same signs and complications that are inherent in both pathologies. In the clinical picture of such patients, the symptoms of the pathology that has a more pronounced severity of the stage of the disease and its complications prevail.

**Conclusion.** The presence of infravesical obstruction and the aggravation of the stage of BPH increases the incidence of cystolithiasis and aggravates the clinical picture of urolithiasis, leading to its complications. At the same time, the presence of concomitant urolithiasis aggravates the clinical picture of BPH, that is, there is a syndrome of mutual weighing of clinical symptoms. There is no general and specific clinical picture in the clinic. There are the same signs and complications that are inherent in both pathologies. Therefore, there is a need for a deeper study of such patients for the correct diagnosis and choice of a rational method of treatment.

**Perspectives of further research.** There is a need for a more in-depth study of patients with ICD against the background of BPH for proper diagnosis and selection of a rational treatment method.

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### ЧАСТОТА ЗУСТРІЧАЄМОСТІ І КЛІНІЧНА КАРТИНА МОЧЕКАМ'ЯНОЇ ХВОРОБИ НА ФОНІ ДОБРОЯКІСНОЇ ГІПЕРПЛАЗІЇ ПЕРЕДМІХУРОВОЇ ЗАЛОЗИ

Мірзосєв І. М.

**Резюме.** *Мета* - виявити частоту зустрічаємості сечокам'яної хвороби на тлі доброякісної гіперплазії передміхурової залози; з'ясувати, чи впливає її наявність на частоту зустрічаємості сечокам'яної хвороби; виявити симптоми загальної або специфічної клінічної картини у випадку поєднаної сечокам'яної хвороби з доброякісною гіперплазією передміхурової залози.

*Матеріал та методи.* Проаналізовані клінічні дані 152 хворих віком 45-87 років, які проходили обстеження та лікування з приводу сечокам'яної хвороби в 2005-2015 роках в Азербайджанському

Державному Інституті Удосконалення лікарів імені А. Алієва, та в Ширванському Лікувально-Діагностичному Центрі в 2008-2015 роках.

**Результати.** Виявлено, що у хворих старше 45 років нефролітіаз на фоні доброякісної гіперплазії був діагностований в 34,21% випадках; уретеролітіаз на фоні доброякісної гіперплазії передміхурової залози – у 21,71% випадках, цистолітіаз на фоні доброякісної гіперплазії передміхурової залози – у 73,4% випадках, цистолітіаз та каміння верхніх сечових шляхів на фоні доброякісної гіперплазії передміхурової залози – в 17,8% випадків. Основну масу обстежуваних склали хворі, у яких на фоні доброякісної гіперплазії передміхурової залози були камені сечового міхура.

**Висновки.** Наявність *інфравезикальної обструкції та обтяження* стадії доброякісної гіперплазії передміхурової залози збільшує частоту зустрічаємості цистолітіаза та посилює клінічну картину уролітіазу, що сприяє виникненню його ускладнень. Наявність супутнього уролітіазу посилює клінічну картину доброякісної гіперплазії передміхурової залози, тобто діагностується взаємне обтяження клінічної симптоматики. Загальної або специфічної клінічної картини не виявлено, відмічаються ознаки та ускладнення, які притаманні обом патологіям.

**Ключові слова:** сечокам'яна хвороба, доброякісна гіперплазія передміхурової залози, інфравезикальна обструкція, дизурія, ниркова коліка, симптом нижніх сечових шляхів.

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A – Work concept and design, B – Data collection and analysis,  
C – Responsibility for statistical analysis, D – Writing the article,  
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*The authors of this study confirm that the research and publication of the results were not associated with any conflicts regarding commercial or financial relations, relations with organizations and/or individuals who may have been related to the study, and interrelations of coauthors of the article.*

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