Characteristics of Calculi in the Urinary Tract

Jelena Kovacevic Prstojevic, Dzelaludin Junuzovic, Munira Hasanbegovic, Zahid Lepara, Mirsad Selimovic

Urology clinic, Clinical center of Sarajevo University, Bosnia and Herzegovina

Corresponding author: Jelena Kovacevic-Prstojevic, MD, Msc, Urology clinic. Clinical center of University of Sarajevo, Bosnia and Herzegovina.
E-mail: urologijakcu@bih.net.ba

ABSTRACT

Introduction: Elimination of stone is determined by size and its localization. Stone from the ureter in 80% of cases can be eliminated spontaneously. If the stone by its characteristics is not spontaneously eliminated, taken are further steps and therapeutic protocols to solve this problem.

Material and methods: The study was prospective, open and comparative. It was conducted at the Urology Clinic Clinical Center of Sarajevo University in the period from 2007 to 2013. The study included 404 patients with urinary tract lithiasis treated by ESWL. ESWL treatment is performed on the machine Siemens Model Lithostar Multiline, which has a combined ultrasonographic and fluoroscopic display, large energy density in order to obtain optimum focus (without damaging surrounding tissue) and minimal pain that on rare occasions requires for mild sedation-sedation.

Results: From a total of 404 patients included in the study there were 234 (57.92%) male and 170 (42.08%) female patients. The most common type of stone both in female and male patients was calcium type. From a total of 262 calcium stones, 105 of them (40.07%) was present in female patients and 157 (59.92%) in male. Share of infectious type of stone in female patients was 63 (49.60%) and 64 among males (50.39%). Other stones were less abundant in both the gender groups and their total number was only 17. In women their frequency was 2 (13.33%) and 13 among males (86.67%). There was a significant difference in the frequency of different types of stones by gender ($\chi^2 = 11.47, p = 0.009$). Conclusion: There was no statistically significant correlation between the number of treatments and localization of stones in the ureter, as well as a statistically significant correlation between the size of the stone and the localization of calculus in the ureter.

Key words: stone in urinary tract, ESWL method of urinary stone treatment.

1. INTRODUCTION

Every year between the 1200 to 1400 persons per million develop urinary calculi with a male to female ratio of 3:1 (1). Urology is probably the oldest branch of surgery, knowing that one of the first operations was safe and resolve stone jammed on the outer opening of the urethra (2).

Creation of stones in the urinary organs (uro lithi asis) is a very common disease (3). Urinary tract stones are sixth health problem. Epidemiological data suggest an increased prevalence of upper urinary tract calculi in developed countries (4). Various authors suggest that urinary calculi constitute 1-3 per thousand total hospitalized patients which makes 15-24% of patients in the urology departments (5). This disease have several names: nephrolithiasis—meaning kidney stone, nephrolithiasis and the word is derived from the Greek word nephros (kidney) and lithos (stone). Word of urolithiasis—urinary (urine) stone is derived from the French word urine and Greek ouron meaning urine. It is also used as renal calculi from the Latin word calculus (plural—calculi), which means gravel. Urolithiasis also affects animals: the stones were found in dogs, cats, rabbits, minks, etc., and the components are the same as in humans (1). Urolithiasis occurs during the most productive human age from 30 to 50 years of age, but has been described in all age groups (6). It was found in newborns and fetuses. However, urolithiasis in children is rare. Only 2-3% of cases occur in the pediatric age (7). It is believed that 12% of men and 4% of women in developed countries suffer from urinary stones. In case of a positive family history, this number doubles (2). One of the reasons for its frequent occurrence in men is explained by the increased endogenous production of oxalate in the liver under the influence of testosterone, while in the urine of women is on average higher concentration of citrate, otherwise, increase the solubility of calcium. Calculosa with women predominantly induced urinary infections and metabolic disorders, while in men predominate idiopathic lithiasis or calcium lithiasis and uric acid (5). Percentage of recurrent calculosis is 50% within 5 years and 70% over 10 years (8). Stones less than 2 mm easily pass through the ureter. Most calculi (90%) from 4 to 5 mm are eliminated spontaneously. Percentage decreases to 50% at stones of 4 to 6 mm and 20% at stones larger than 6 mm (1,2).

2. PROBLEM FORMULATION

One of the most common pathological conditions in human medicine is the presence of a stone in the urinary tract, characterized more often as urolithiasis. In countries with developed industry this disease affects approximately 1500 to 2000 patients per million inhabitants. The disease usually affects people in the fourth and fifth decade of life who are working, and their absence from work due to healing has significant social and economic implications on the society. Stones can be localized in...
different areas of the urinary system. Localization of the stone is determined by several factors, including even the demographic characteristics. In developed countries, 97% of the stones are localized in the kidney and ureter where in 59% of cases in the ureter. Urethral stone is in 75% of cases located in the iliac and pelvic part of the ureter (1, 3). Elimination of the calculi depends on size and its localization. Stones from the ureter in 80% of cases can be eliminated spontaneously. If the calculi in their characteristics are not spontaneously eliminated, taken are further steps and therapeutic protocols to solve this problem. Asperitan stone and stone larger than 7 mm in diameter, which practically cannot be spontaneously eliminated, threatening development of kidney urostasis and infection (2). Indications for an active therapeutic approach to ureter stones is stone diameter over 7 mm with low (below 20%) probability of spontaneous elimination or absence of spontaneous stone elimination of any size for a period longer than 30 days from the first renal colic, urinary infection develop, sepsis, calculous anuria, as well as the request of patients. Treatment of urolithiasis includes conservative, surgical treatment, and treatment with extracorporeal shock wave lithotripsy (ESWL) depending on the evaluation. Recently, endoscopic procedures, such as ureteroscopy (URS) and percutaneous lithotripsy (PCNL), together with the aforementioned ESWL, have been almost entirely replaced open surgery, so in just 30 years, radically changed the approach and functional outcome of this disease (1, 2).

ESWL treatment is the first-line treatment of urinary tract stones, but there are still no clearly defined limits and recommendations for its use in the treatment of urinal calculi, depending on its location, size and morphological structure. This raises the question of efficiency of ESWL depending on the characteristics of urinal calculi.

3. GOALS

Determine characteristics of the patients with calculi in the urinary system, possibilities of disintegration of stones and its spontaneous elimination dependent on morphological structure of stones, their size and location in the urinary tract.

4. MATERIAL AND METHODS

The study was prospective, open and comparative. It was conducted at the Urology Clinic Clinical Center of Sarajevo University in the period from 2007 to 2013. The study included 404 patients with urinary tract lithiasis. All patients prior to initiation of therapy–ESWL treatments were subjected to the following diagnostic procedures: anamnesis, clinical examination of patients, laboratory tests, ultrasound examination of the urinary tract and urinary tract X-ray, from which was derived several diagnostic procedures: anamnesis, clinical examination of patients, laboratory tests, ultrasound examination of the urinary tract and urinary tract X-ray, from which was derived a morphological analysis of the stone composition. Diagnosis is used in the detection of complications such as obstruction with dilatation of the renal coloroletic system, reduction of the renal parenchyma and in monitoring of renal obstruction during treatment. This type of diagnosis is not suitable for stones in the ureter and can only be made by small calculi and dilute radiolucent concrement. ESWL treatment is performed on the machine Siemens Model Lithostar Multiline, which has a combined ultrasonographic and fluoroscopic display, large energy density in order to obtain optimum focus (without damaging surrounding tissue) and minimal pain that on rare occasions requires for mild sedation-sedation. For nominal and ordinal variables chi-square test was used. In cases when the frequency was lower than expected was used the Fisher’s exact test. The degree of correlation was determined by means of the Spearman. P value of <0.05 was considered statistically significant. Statistical analysis was performed using SPSS computer software for statistical analysis (SPSS Statistical Package for the Social Sciences) version 13.0.

5. RESULTS

From a total of 404 patients included in the study there were 234 (57.92%) male and 170 (42.08%) female patients. The most common age group in the sample was at age from 35 to 45 years and consisted of 110 respondents (27.09%). The minimum number of respondents had the age over 65 years 19 respondents (4.67%). The most common type of stone both in female and male patients was calcium type. From a total of 262 calcium stones, 105 of them (40.07%) was present in female patients and 157 (59.92%) in male. Share of infectious type of stone in female patients was 63 (49.60%) and 64 among males (50.39%). Other stones were less abundant in both the gender groups and their total number was only 17. In women their frequency was 2 (13.33%) and 13 among males (86.67%). There was a significant difference in the frequency of different types of stones by gender ($\chi^2 = 11.47, p = 0.009$). Due to the very low prevalence of other types of stones and inability to perform the chi-square test to a group of other stones are grouped stones which, by virtue were cystine, xanthine stones and uric acid stones. The incidence of cystine calculi was 4 (0.9%), frequency of xanthine stones 3 (0.7%) and uric acid 8 (1.9%). In the group of female respondents 74 (40.88%) had calculus size up to 10 mm, while in the group of male patients stone size up to 10 mm had 107 (59.12%). In the group of female respondents 96 of them (43.05%) had a size of stone exceeding 10 mm, while in the group of male patients stone size over 10 mm had 127 (56.95%). There was no statistically significant difference in the incidence of stones with sizes up to 10 and over 10 mm by gender ($\chi^2 = 0.192, p = 0.661$).

Number of stones localized in the upper pole of the kidney in women was 43 (48.86%), and among men was slightly lower and amounted to 45 (51.13%). Number localized in the lower pole of the kidney in women was 22 (61.11%), and among men was slightly lower and amounted to 14 (38.88%). Number of stones localized medially among women was 38 (45.78%), and among men was slightly lower and amounted to 45 (54.21%). Number of localized in the renal pyelon in females was 27 (40.39%), and among men was slightly lower and amounted to 40 (59.70%). There was no statistically significant difference in the frequency of localization of stones by gender.

The incidence of urolithiasis at the site of physiological narrowing of the ureter in female subjects was 22 (27.5%) and 58 in males (72.5%). The incidence of urolithiasis at the site of the physiological enlargement of the ureter in female subjects was 8 (50%), and the same among men 8 (50%). There was no statistically significant difference in the frequency of localization of calculi to physiological narrowing and widening of the ureter in relation to gender differences ($p = 0.086$).

The most common size of the calculi in the sample was 15 mm. This size had 21.04% of respondents. The second most common size of the calculi in the sample was 9 mm, which had
14.6% of respondents, followed by the size of 20 mm, which had 14.38% of the respondents. The least frequent size calculi were 17 mm, which was only 0.25% of the respondents.

Size of the calculi in women was 12 (8-15 mm), while in men it was 12 (8-15 mm). There was no statistically significant difference in the size of calculi between males and females (p = 0.557).

There was a significant mild positive correlation between age and size of the stone in the total sample (ρ = 0.240, p < 0.01), i.e. Increase with age slightly increases the size calculi.

In the group of patients who had a negative family history of calculus size to 10 mm were present in 108 (59.67%), while in the group of subjects who had a family history size of stones up to 10 mm had 73 (40.33%). In the group of patients who had a negative family history of calculus size over 10 mm was registered in 160 (71.75%), while in the group of subjects who had a positive family history of calculus size over 10 mm was registered in 63 (28.25%). There was a statistically significant correlation between the size of stones and positive / negative family history ($\chi^2 = 6.529$, p = 0.011), respectively, in patients with a positive family history more often were present small stones (to 10 mm).

Size of the calculi in patients who had a positive family history was 12 (9-15 mm), while the size of stones in patients who had a positive family history was 10 (8-15 cm). There was no statistically significant difference in the size of the stones between the groups of patients (p = 0.013).

Size of calculi in patients without recurrent urolithiasis was 11 (9-15 mm), while the size of the calculi in patients who have had recurrent urolithiasis was 12 (8-15 mm). There was no statistically significant difference in the size of calculi between groups of patients (p = NS).

Frequency of localization in the upper pole of kidney which have the size of 10 mm was 30 (34.09%), while the frequency of localization in the top half of kidney which had more than 10 mm in size was 58 (65.91%) (Table 1).

Frequency of localization in the lower pole of the calculi that had the size of 10 mm was in 3 cases (8.33%), while the same localization in renal pole (Fisher’s exact test, p = 0.003).

Looking at the frequency of stones it is a lot bigger on the top half, but looking at their size, larger stones (over 10 mm) were significantly more often present in the lower half.

Size of calculi localized medially was 14 (10-15 mm), while the localization pyelon was 15 (12-18 mm). There was a significant difference in size between the mentioned calculus localization (p = 0.022). Stones that occur in the renal pyelon are higher than the stones that are found in our study, in median position.

Frequency medial localization of calculus which size was less than 10 mm was 33 (39.75%), and frequency of 50 (60.25%) for stones ranging in size over 10 mm. Pyelon localization of calculus which size was less than 10 mm was 5 (7.46%), and frequency of 62 (92.53%) for stones ranging in size over 10 mm. There was a significant correlation between the size of the stone and localization of stones (medial / pyelon) ($\chi^2 = 20.443$, p < 0.001).

Frequency of calculi localization at sites of physiological stricture site that had the size of 10 mm was 68 (85%), while the frequency of localization at sites of calculus physiological stricture site which had the size over 10 mm was 12 (15%). Frequency of localization at sites of calculus enlargement physiological ureter which had the size of 10 mm was 15 (93.75%), while the frequency of localization at sites of calculus enlargement physiological ureter which had the size over 10 mm, was 1 (6.25%). There was no statistically significant dependence between the size of tartar and calculus localization to physiological constriction and expansion of the ureter (p = 0.688) (Table 2).

In the group of patients under 35 years the incidence of calcium stones was 88 (33.58%), while in the age group of 35-55 years the incidence of other types of calculi was 7 (46.66%). The incidence of other types of stones in patients under the age of 35 to 55 years was 26 (20.47%), and at the age of 35 to 55 years the incidence of infectious types of calculi was 39 (39.75%). In the group of patients older than 55 years was 38 (29.92%). In the group of patients under 35 years the incidence of other types of stones was 4 (26.66%), while in the age group of 35-55 years the incidence of other types of calculi was 7 (46.66%). The incidence of other...
Characteristics of Calculi in the Urinary Tract

The incidence of kidney stones is influenced by various factors. The formation of a kidney stone or a calculi occurs when the solubility of the urine is exceeded, leading to crystal growth and precipitation. The process involves the nucleation and growth of crystals, which are then nucleated in the urinary tract, often in the collecting tubules, cups, and pyelon. The incidence of urolithiasis in the bladder is 10.6% for men and 7.1% for women, which is higher than the incidence of stones in the upper urinary tract. The disease is more common in men and older individuals, possibly due to hormonal influences and differences in urine composition (1).

Formation of kidney stones attempted to explain many theories; however, none fully explains the mechanism of occurrence. The incidence in England is 22 cases per 100,000 inhabitants, in Kuwait 23.9 per 100,000 population. However, in some countries there are significant differences in the incidence, such as Sweden, where the incidence of 140 per 100,000 inhabitants, Italy 168 per 100,000 inhabitants and United States with high prevalence of 277 per 100,000 population. In Europe, urinary stones are found mainly in the upper urinary tract, while the proportion of stones in the bladder does not exceed 10.0%. It is shown that the urinary bladder calculi more common in the elderly (12).

Some new studies are mostly directed of change in the relationship of occurrence calculi in men and women. In the United States--and the data showed that the overall incidence of urolithiasis 10.6% for men and 7.1% for women. This is explained by balancing risks for both men and women today, compared to the past when they were significantly different (13).

Table 3. Dependence of age and types calculus. *χ²=15.170 df=4; p=0.004*

<table>
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<tr>
<th>Age groups</th>
<th>Type</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>calcium</td>
<td>infectious</td>
</tr>
<tr>
<td>Up to 35 years</td>
<td>N 88</td>
<td>26</td>
</tr>
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</tr>
<tr>
<td>% type</td>
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<td>20.47244094</td>
</tr>
<tr>
<td>% Total</td>
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<td>6.43564356</td>
</tr>
<tr>
<td>Over 55 years</td>
<td>N 135</td>
<td>63</td>
</tr>
<tr>
<td>% age groups</td>
<td>65.85366</td>
<td>30.73170732</td>
</tr>
<tr>
<td>% type</td>
<td>51.52672</td>
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<td>15.59405941</td>
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<tr>
<td>Total</td>
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<td>% Total</td>
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Types of calculi in subjects older than 55 years was 4 (26.66%). Statistically significant dependence between age and type of calculi (χ² = 15.170, p = 0.004) (Table 3).

6. DISCUSSION

Renal lithiasis is a disease in which the stones were formed in the collecting tubules, cups and pelvis. The incidence was similar in both kidneys, and about 40% of patients had bilateral stones. There is a wide range of risk factors that may be associated with the disease, including local and general factors. Of local risk factors that favor the emergence of this disease are: trail of urine, disorders of innervation, anomalies of drainage pathways, anatomical abnormalities (spoon kidney, horseshoe kidney), and recurrent infection. General risk factors are categorized as: metabolic (calciuria, cystinuria), hormonal (primary hyperparathyroidism, hyperthyroidism and hypovitaminosis) and other factors such as climatic conditions of life, feeding, pH of urine excretion of concentrated urine, prolonged immobilization, etc. (1, 9, 10).

Formation of kidney stones attempted to explain many theories but none fully explains the mechanism of occurrence. Urine is in the usual conditions supersaturated solution in which the particles are held in solution influence crystallization inhibitor and colloids. If these factors are disrupted leads to precipitation and aggregation of crystals. The organic matrix, which consists of cellular detritus, blood and bacteria may be the main factor that leads to nucleation and crystal growth. One theory in the spotlight puts deficit of crystallization inhibitors. There is a theory which states that the formation of stones occurs when the crystals, which are constantly being created in the urine supersaturated with salts, are not washed away in the urine. This may occur due to damage to the epithelial duct to which it adheres crystal (11).

Changes in the socio-economic conditions have influenced the changes in the frequency and type of urolithiasis in terms of localization and physico-chemical properties of stones. Major variations on the occurrence of urolithiasis in the world are presented to the public in terms of geographical areas. Annual

When it comes to the size calculi, the results of our study showed a statistically significant positive correlation between age and size of the stone in the total sample (rho = 0.240, p < 0.01. Classifying respondents into three age groups, our results showed that the highest incidence of stones measuring greater
than 10 mm was represented at the age between 35 and 55 years. 
Chi-square test showed a statistically significant correlation 
between age and size of the stone ($\chi^2 = 40.287$, $p < 0.00005$).

The study by Alaya and associates (12), who analyzed the 
sample of 1301 urinary tract stones, it has been proven that the 
highest percentage share of 58.6% occupied stones of calcium type, 
that type of calcium oxalate, but they also recorded an 
increase in the incidence and types of stones uric acid. The au-
authors believe that in the last 50 years there has been a change in 
eating habits associated with an increase in foods rich in purines (animal proteins projections and seafood), which correlates the 
increase in uric acid in the urine, and increasing incidence of 
this type of calculi. Their results show a clear increase in uric 
acid stones in both sexes.

The results of our study showed that the group of patients 
under 35 years the incidence of calcium stones was 33.58%, the 
incidence of infectious stones 20.47%, while the incidence of 
other types of stones was 26.66%. At the age of 35 to 55 years 
the incidence of a calcium type of calculi was 51.52%, the frequency of 
the infectious type of calculi was 49.60%, and the prevalence of 
of other types of stones was 46.66%. The frequency of this type 
of calcium calculi in subjects older than 55 years was 14.88%, 
infectious stones were 29.92%, while the incidence of other types 
of calculi in subjects older than 55 years was 26.66%. There was 
a statistically significant correlation between age and type of 
calculi ($\chi^2 = 15.170$, $p = 0.004$), i.e. among younger patients 
are the most common types of calcium stones, while the inci-
cidence of infectious types of stones rarer. Increasing age leads to 
equalization of the frequency of calcium and infectious stones.

Differences in the incidence of age and stones were analyzed 
through a large number of epidemiological studies. There are 
certain variations according to geographical areas. In 1993, 
Baker et al (15) reported that in Australia peak incidence of 
urolithiasis calcium oxalate sampled observed in individuals 
between 50 and 60 years of age. In Europe, research shows that 
the stones which are chemically calcium oxalate more common 
in people between 40 and 50 years of age. In Asia, the highest 
prevalence of calcium oxalate stone formation occurs at an ear-
lier age range 30 to 50 years (1).

Certain hereditary disorders that run in the family increases 
the risk of recurrent kidney stones. A rare hereditary disease, renal 
tubular acidosis, increases the acidity of urine, which is favorable 
for the occurrence of kidney stones. Cystinuria is a hereditary 
disorder of the metabolism of amino acids, which results in high 
levels of cystine in the urine and blood, leading to frequent for-
mation of cystine kidney stones. Second, a hereditary disorder of 
metabolism, hyperoxaluria, is resulting in high levels of oxalate 
salt in the body, which is combined with calcium in the form of 
kidney stones. Hypercalcuiuria causes high accumulation of cal-
cium in the body, which increases the incidence of kidney stones. 
Hiperuricosuria increased level of uric acid in the urine, which 
leads to the formation of uric acid stones (1,3).

Diet, in terms of animal protein (52 g / day), sodium (50 mg / day) 
and the oxalate (200 mg / day) with a normal intake of 
calium (1,200 mg / day), reduced recurrent stones for almost 
50% and more, within five years, compared to a diet low in cal-
cium (400 mg / day) and oxalate (16).

Our results show that the proportion of respondents who 
did not have positive personal and family history of urolithiasis 
was 44.94%, and patients who had a positive family history of 
ulithiasis, but he had a personal history was 50.05%. The share 
of respondents, who had a family history, and negative personal 
history of urolithiasis, was 42 (30.88%), while the number of 
respondents who had a positive to families and personal history 
was 136 (33.74%). There was a significant frequency dependence 
of family and personal history ($\chi^2 = 7.41$, $p = 0.006$), i.e. Higher 
incidence of recurrence in patients who have a positive family 
history of urolithiasis.

Similar results were presented by the study Koyuncu and as-
ociates (17,1), which showed a significant correlation recurring 
calculi and positive family history. The authors also found that 
the time interval between the onset of recurrence was signifi-
cantly shorter in patients who had a positive family history of 
urolithiasis. By analyzing the patients according to sex, the au-
authors noted that the incidence of recurrence was more frequent 
in males than females respondents. The authors believe that the 
information positivity family history is very important and can 
provide valuable information about the possibility of future at-
tacks as well as the severity of the disease.

Epidemiological and randomized studies have shown greater 
security ESWL treatment methods in breaking stones when it 
starts with applying lower energy sequences of the same, with a 
gradual increase energy sequences, resulting in a vasosonstric-
tion which prevents renal damage and the difference in the 
fragmentation is not significant despite the fact that whether 
amplification is carried out or not (1).

Previous clinical and epidemiological studies have shown 
that as an indication of ESWL treatment of urolithiasis depends 
several factors, including the size, localization, consistency 
and other histological characteristics of calculi (1,2). Pregnancy 
and specific internship and urological diseases, with an empha-
sis on acute urinary infection, contraindications to perform of 
ESWL (4).

7. CONCLUSION

From a total of 404 patients included in the study there was 
57.92% male and 42.8% female respondents, or male : female 
ratio of 1.2 : 1, while the most common age group in a sample 
of patients with urolithiasis was between 35 and 45 years (27%). 
The mean size of the stones in men and in women was 12 mm.

Most frequent type of calculi both in female and male sub-
jects was of calcium type. In younger patients the most common 
are calcium stones, with increase in respondents age calcium and 
infectious stones frequencies were equalized.

There was a significant correlation between the size of the 
stone and its localization in renal pole. The incidence of stones 
was significantly greater in the top half, but the size of large 
stones (over 10 mm) were significantly more present in the 
lower kidney pole.

There was no statistically significant relationship between the 
size of stones and personal history, but statistically significant 
correlation is determined between the size of the stone and 
family history of urolithiasis.

Also there was significant correlation between the size of the 
stone and its localization (medial / pyelon). Stones up to 10 mm 
are more frequently localized medially, and those larger than 10 
mm are somewhat more common in the pyelon.

CONFLICT OF INTEREST: NONE DECLARED
REFERENCES


INSTRUCTIONS FOR THE AUTHORS

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The paper has to be typed on a standard format (A4), leaving margin at least to be 3 cm. All materials, including tables and references, have to be typed double-space. So that one page has no more than 2000 alphanumerical characters (30 lines) and total number of used words must not to be more than 3,500. Presenting paper depends on its content, but usually it consists of a title page, summary, text, references, legends for pictures and pictures. Type your paper in MS Word and send it on a diskette or a CD-ROM, so that the editing of your paper will be easier.

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AUTHENTIC PAPERS CONTAIN these parts: introduction, goal, methods, results, discussion and conclusion. Introduction is brief and clear review of the problem. Methods are shown, so that interested reader is able to repeat described research. Known methods don’t need to be identified, they are cited (referenced). If drugs are listed, their generic name is used, (brand name can be written in brackets). Results need to be shown clearly and logically, and their significance must be proven by statistical analysis. In discussion, results are interpreted and compared to the existing and previously published findings in the same field. Conclusions have to give an answer to author’s goals.

REVIVING REFERENCES MUST be on a scale, in which they are really used. Quoting most recent literature is recommended. Only published articles, (or articles accepted for publishing), can be used as references. Not published observations and personal notifications need to be in text in brackets. Showing references must be as how they appear in the text. References cited in tables or pictures are also numbered according to the quoting order. All references should be compiled at the end of the article in the Vancouver style or PubMed style (i.e. www.scopemed.org).

TESTS USED FOR statistical analysis need to be shown in text and in tables or pictures containing statistical analysis. TABLES HAVE TO be numbered and shown by their order, so they can be understood without having to read the paper. Every column needs to have a title, every measuring unit (SI) has to be clearly marked (i.e. preferably in footnotes below the table, in Arabic numbers or symbols). Pictures also have to be numbered as they appear in the text, drawings need to be enclosed on a white or tracing paper, while black and white photos have to be printed on a radiant paper. Legends (e.g. next to pictures and photos), have to be written on a separate A4 format paper. All illustrations, pictures, drawings, diagrams, have to be original, and on their backs contain, illustration number, first author’s last name, abbreviated title of the paper and picture at the top. It is appreciated, if author marks the place for the table or picture. Papers could not be submitted with included more of 4 Tables, Figures or Graphs. Every additional must be paid 20 euros each.

USE OF ABBREVIATIONS have to be reduced to a minimum, USE OF ABBREVIATIONS have to be reduced to a minimum, so that interested reader is able to repeat described research. Known methods don’t need to be identified, they are cited (referenced). If drugs are listed, their generic name is used, (brand name can be written in brackets). Results need to be shown clearly and logically, and their significance must be proven by statistical analysis. In discussion, results are interpreted and compared to the existing and previously published findings in the same field. Conclusions have to give an answer to author’s goals.

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