

VII. Évfolyam 2. szám - 2012. június

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## MILITARY ASPECTS OF URINARY TRACT STONES

### *Absztrakt/Abstract*

*A húgyúti kövesség előfordulása gyakori a polgári lakosság körében és a hivatásos és szerződéses állomány körében is. Jelenleg nincs szűrés a betegségre a Magyar Honvédségnél. Bemutatjuk a betegség főbb jellemzőit, beleértve az előfordulást, az anatómiát, a kezelést és a speciális katonai vonatkozásokat. Következtetésünk szerint a kiutazó és a missziós szolgálatot teljesítő állomány alapos szűrése ajánlott, a súlyos tünetek megelőzésére és a harcérték csökkenés kiküszöbölésére.*

*The urinary tract stones are common in the mean population as well as in the military staff. There is no screening in the Hungarian Army in connection with urinary stone disease. We present the major principles about this disease, including incidence, anatomy, treatment and special military aspects. The conclusion is we suppose the careful screening the urinary tract stone disease including the outgoing staff and soldiers in the operational area to prevent major symptoms and force power loss.*

**Keywords:** *húgyúti tünetek, kőbetegség, szűrés, prevenció, missziós egészségügy ~ urinary tract symptoms, stone disease, screening, prevention, military healthcare*

## 1. INCIDENCE DATA

The urinary stone is a common disease, the prevalence in the adult civilian population shows different values, but in various of studies are estimated to be 7.8% [4]. The difficulties that the prevalence data of disease without symptoms are only approximate, in the mean population the regular check-ups have not preformed. The urinary stone disease is twice as common in men than in women.

Unfortunately, in the Hungarian Defense Forces the screening of urinary tract stones is not routine, so we have not got correct information about real-occurrence data. In the major surveys the incidence of stones 3.8% (men aged between 20-40 years) [4], this is assumed to correspond to the ratio in the Hungarian Army and a professional staff.

We have the following major missions are under way (staff number):

Pol-e-Kumri Afghanistan (292+32), Vardak Afghanistan (16), Kabul Afghanistan (10), Mazar-e Sharif Afghanistan (10), Pristina Kosovo (238), Sarajevo BIH (155), Nicosia Cyprus (84).

## 2. FUNCTIONAL ANATOMY

The kidneys are located behind of the peritoneum, so-called in the retroperitoneal space. The major function is the urinary excretion and collection. The secreted urine by the kidney cortex pass through the medulla and to be collected by the renal calyces. The urine collected in the calyces continue the way to the renal pelvis. This is a relatively broad bay, which is normally barely visible, but it is able to expand if the urine can not leave the upper urinary tract system. The funnel-shaped narrowing of the renal pelvis continues in the ureter. The ureter is a muscular walled tube with an approx. 1-2mm internal diameter, that delivers urine to the bladder by the active muscle work. The narrowest part of the ureter is in the pelvix, where crosses the vessels (iliac artery and vein). The ureter transports the urine to the bladder, wich is a storage with very elastic, muscular wall. The collected and temporary stored urine leaves the human body through the urtehra. Intact urinary tract with good functionality is essential for daily activities.

The urine contains substances in solution, in high concentration it leads to crystallogenesis, the crystals aggregation makes the urinary stones. The typical locations of stone genesis are the areas where the flow of urine decreases, so the crystals can settle down. Most of the stones start to grow in the calices. If a stone core was formed, the precipitation continues, the stone grows. The stones go to the renal pelvis from the calices then continue their journey through the ureter to the bladder. From the bladder they leave the body with urine stream when voiding.

## 3. STONE JOURNEY

The stones less than 1mm are typically excreted without hindrance, with minimal or without symptoms. The stones bigger than 1mm in the ureter cause a wall scratch, and the ureter with strong muscular wall answers a reflex contraction with spasm. The spasm brakes the urine flow in the ureter the pressure in the collecting system increases. It causes dilatation of renal pelvis and the part of the ureter before stone. The high mechanical stress causes pain and spasm, very difficult to attenuate. When the spasm resolved, the urine can flow again with limited flow, but the tension of urinary system decreases. The way to the bladder the stone can move slowly toward the spasm process can be repeated several times. To 5mm stone size, spontaneous emptying is likely, the chance of voiding stones greater than 6 mm is low, because of the limited elasticity of the ureter. They usually need invasive procedure to reach

stone-free state. The larger size (greater than 10mm) stones is usually not reach the ureter, they stay in the renal pelvis, the urine can leak beside this stones, causing mild symptoms, or can be completely asymptomatic. Exceptions are the triangular-shaped stones, which completely can close the renal pelvis emptying like a plug. There are stones that fill the renal cavity system is partially or completely, which are rare in the active fighting strength so this article does not deal with [2].

#### **4. TYPES OF STONES**

In the case of urinary tract stone disease, we can say difference between active and passive stones. Passive stones stay adhesive to renal pelvis or renal calix mucosa, not to cause strong symptoms complaint, mostly microscopic haematuria may occur. These stones are sized from 1 mm up to cm. They does not cause urinary obstruction, but if became infected, they can be a source of infection. Mainly, this type of stones usually stay in the renal pelvic mucosa or renal calyx, and very rare in the ureter and urinary bladder.

Caused by some internal or external factors, the passive stones can lose their connection with mucosa and can be an active stone, which drift in the urine flow. Often these stones are responsible for severe and pronounced symptoms.

#### **5. THE SYMPTOMS OF URINARY TRACT STONES**

The symptoms ratio has been calculated from our outpatients form the last 2 years.

The 90% of symptoms of urinary tract stones caused by partially or completely blocked urine flow. Sudden onset of unilateral renal region back pain which typically radiates to the ipsilateral groin, increased to rest and little relieved to movement. Nausea (25%), vomiting (10%), which is in connection with tension of renal capsule. Shivering-fit in 22% of cases have found. The 5% of kidney cramp cause fever (core temperature above 38C degrees), subfebris in 12% was associated with symptoms.

Diagnostic laboratory findings are elevated white blood cell count at 8%, elevated CRP is present at 14% of cases. The typical laboratory finding is the microhaematuria (70%) and leucocyturia (20%). If it is possible to carry out the ultrasound examination, 95% of the cases indicates renal pelvis dilatation which continues to initial part of the ureter. The contralateral kidney continued to function normally because of that, urine produced, but the stone-induced stimulation of bladder causes frequent need to urinate (30%). If the urine test is negative, and renal ultrasonography shows a one-sided outflow obstruction, the possibility of complete obstruction increased, it needs attention, and often urgent intervention.

#### **6. THE MILITARY SIGNIFICANCE OF URINARY TRACT STONES**

The special significance of the disease in the fact that if it happens in mission the fighting soldiers force and activity is significantly reduced in most cases, the task can not be continued by the human. The high degree of stress reaction not only reduces the force power of their own, but also reduces the fellow combat unit value. Since there is insufficient awareness about the disease among the units, typically under the stress fear and perplexity also reduces the responsiveness of the unit. The reduced movement capable and the stress response cause poor judgment, even more soldiers to occupy the unit. In operational area the diagnosis can be difficult, significantly eroding the collective psyche [3].

The inactive urinary stones can became active by increased physical activity, irregular intake of fluids, sudden pressure change, the physical and psychological stress caused by increased muscle tone which is present in the operational area.

## 7. THE SCREENING OF URINARY TRACT STONES

Screening the urinary stones is possible with abdominal-pelvic ultrasound tests, X-ray native kidney and urine tests and urine examination. These three tests can find the 90% of the stones, but especially the abdominal ultrasound test depends strongly on the performer practice. The most reliable screening method is the abdominal-pelvic CT scan with high slice thickness, but for screening it has high radiation exposure and high cost. Because of that the CT scan is not in use for urinary tract stone screening.

Current in the Hungarian Army the only screening method for urinary stone is the urine test, which has low sensibility and specificity values in connection with this disease. (Specificity 50%, sensitivity 20% or less)

Because of that, it can be said that the incidence of urinary stones in the Hungarian Army missions outgoing staff is nearly the same incidence among Hungarian civilians, and even can be higher than that due to stress.

## 8. THE TREATMENT OF URINARY STONES

The treatment of urinary tract stones includes invasive and non invasive procedures.

The non-invasive methods are useful in operational procedures; require no special expertise, used parts, high cost instrumentation and professional staff. The treatment is based on pain relief and antispasmodics. The drugs cause ureter relaxation; the urine can flow beside the urinary stone. At the same time, the symptoms are reduced; the value of force power can reach the starting point as well. This has great importance in operational area, temporary gains during 1-2 hours of activities; the activity closing can be organized and planned. The soldier can be transported to the emergency or supply point for further treatment, replacement can be arranged. The team doctor consultation with urology specialist can also be arranged. If specialist care is not available, the antibiotic therapy must be started blindly (no target therapy) to consider the complication of kidney obstruction.

The invasive modes will be discussed only briefly, which provided only in the background institutions, operational or military hospitals accessibility in the operational area is limited or absent.

To ensure the urine flow, double "J" catheter or nephrostomia can be used. Extracorporeal in situ Shock Wave Lithotripsy (ESWL), endoscopic stone surgery the possible alternatives.

## CONCLUSION

The screening of urinary tract stones in the future, further improvements are recommended, which include enhancement of the outbound staff filtering, careful monitoring the soldiers in the operational area. In fact of the pre-existing risk factors, the preventive steps must be taken. The team doctors must be trained the correct detection of urinary stone attack, a strong, quick treatment, patient care. A new treatment protocol can significantly reduce the risk of force power loss and the number of repatriation.

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