The case study in the applicability of the improvements in the treatment of urinary system stone diseases in Anatolia: the last ten years with the sample of Western Black Sea region

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ABSTRACT

Objective: The prevalence of stone diseases is high in Turkey. Thanks to the technological improvements and to the increase in the number of qualified and experienced specialists in the last thirty years, there has been an increase in the application of minimally invasive methods in the stone disease surgery. This study, with a sample survey of Western Black Sea region, aims at revealing the changes and improvements in the treatment of stone diseases in different centers in Anatolia within the last ten years.

Material and methods: Six centers in 4 of the provinces of the Western Black Sea Region were selected and the patients' files were retrospectively analyzed. The treatment methods that were recommended for and/or applied to the patients diagnosed with urinary stone diseases were recorded by years. The urinary stone diseases were divided into three separate groups; kidney, ureters and bladder. Treatment options were recorded into categories as open surgery, percutaneous nephrolithotripsy, retrograde intrarenal surgery, semirigid ureterorenoscopy, flexible ureterorenoscopy, and ESWL.

Results: A total of 26044 patients with stone diseases have been treated in the above-mentioned centers for the last 10 years. The distributions of the stone diseases in relation to their localization were as follows: - kidney stones: 9040 (34.7%), ureter stones: 15264 (58.6%), and bladder stones: 1740 (6.7%). As for the distribution of the treatment in relation to the treatment methods, it was seen that open surgery for 1032 (4%) patients, endoscopic surgery for 15038 (58%) patients, and ESWL for 9974 (38%) patients had been applied. While URS and PCNL are currently the commonly used treatment methods in the Western Black Sea Region, RIRS has begun to be used in a limited number of patients for the last 3 years.

Conclusion: Though being a little late, the advances in endourology offer practical applications in the Western Black Sea region as well. Although this study suggests implications for the evaluating of the periphery outcomes of the improvements in stone disease treatments, for the planning of training schemes, and for equipment planning, further research based on more data from more centers is needed to have a nation-wide perspective.

Keywords: Endoscopy; stone disease; treatment; urinary tract.

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Introduction

The prevalence of stone disease is quite high (14.8%) in our country.^[1] Generally its prevalence is estimated to range between 1, and 13 percent.^[2] An epidemiological study performed in our country revealed presence of endemic stone disease in Turkey with higher prevalence rates reported mostly from Mediterranean Region, Black Sea Region, and Southeastern Anatolia Region.^[3] Therefore urinary system stone disease has an important place in our urology practice. Especially within the last 30 years in parallel with technological advances, important developments have been recorded in the treatment of urinary system stone disease. In the whole world, minimally invasive techniques started to be practiced from 1970 on, and in our country it was introduced into daily practice from 1980 on. Besides, technological advances in radiological imaging modalities have contributed to the development in the management of urolithiasis.^[4] All urological advances achieved in

the world have been very closely observed by university, and training and research hospitals in our country. Then with organized training meetings, and courses generalization of the information has been tried. However the state of applicability of, and accessibility to these advances related to urinary system stone disease in Anatolia are not known fully.

In this study, using Black Sea Region sampling, we aimed to demonstrate changes, and advances in the management of stone disease in different centers in Anatolia within the last 10 years.

Material and methods

Six different centers in four provinces of the Black Sea Region (Kastamonu, Çankırı, Sinop, and Samsun) were selected. Three private, one training and research, 2 state hospitals were included in the study. General distribution of urologists among these hospitals changes as years go by, for instance in the year 2014, 16 staff urologists were working in these hospitals. Patient files of predetermined hospitals were screened retrospectively. In patients with the diagnosis of urinary system stone disease, stones left to spontaneous passage with medical treatment, treatment methods followed up/recommended and/or performed were recorded according to the years they were performed. Urinary system stone diseases were classified based on the location of the stone as renal, ureteral, and bladder stone groups. For renal stone group, treatment options were open surgery, percutaneous nephrolithotomy (PCNL), retrograde intrarenal surgery (RIRS), and extracorporeal shock wave lithotripsy (ESWL). For ureteral stone group, treatment alternatives were determined as open surgery, semirigid ureterorenoscopy (URS), flexible URS, and ESWL. For bladder stone group, open surgery, and endoscopic cystolithotripsy were recorded as treatment options. During this period the patients diagnosed as urinary system stone disease whose stones left to spontaneous passage with medical treatment were excluded from the study.

Results

A total of 26044 cases with urinary system stone diseases were diagnosed, and treated in 6 hospitals in 4 provinces in the Western

Black Sea Region. Distribution of all stones based on their locations were as follows: renal (n=9040), ureteral (n=15264; 58.6%) and bladder (n=1740; 6.7%) stones. Distribution of all stones as for treatment modalities were as follows: open surgery (n=1032; 4%), endoscopic surgery (n=15038; 58%), and ESWL (n=9974; 38%). Distribution of these three treatment methods according to the years is shown in Table 1, and Figure 1.

Distribution of stone groups according to the stone locations, and years of diagnosis, and treatment is shown in Table 2, and Figure 2 for renal, Table 3, and Figure 3 for ureteral, and Table 4, and Figure 4 for bladder stones, respectively.

Discussion

Especially, in our country, from 1980s on, a prominent development has been achieved in endoscopic, and minimally invasive methods for the management of stone disease. Successful applications of minimally invasive endoscopic techniques by novel urologists who have learnt these methods during their training period, and also by senior urologists who have been informed about these treatment alternatives during courses, and short training sessions have popularized their use. Still, in recent years, in line with the increase in the number of universities, level of stone treatment

Figure 1. Distribution of urinary stone management modalities within the time interval between 2005, and 2014 (incl.)

Table 1. Distribution of urinary stone treatment modalities within the time interval between 2005, and 2014 (incl.)

Urinary stone management modalities	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Toplam n (%)
Open surgery	268	162	62	164	124	46	56	70	56	24	1032 (4)
Endoscopy*	234	340	702	1924	2028	1878	1924	1976	2170	1862	15038 (58)
ESWL	74	424	742	1642	1168	1008	1108	1414	1232	1162	9974 (38)
Toplam	576	926	1506	3730	3320	2932	3088	3460	3458	3048	26044

**Endoscopy (ureterorenoscopy, percutaneous nephrolithotomy, retrograde intrarenal surgery)

ESWL: Extracorporeal shock wave lithotripsy

Table 2. Distribution of renal stone management modalities within the time interval between 2005, and 2014 (incl.)

Renal stone management modalities	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total	%
Open surgery	104	70	30	110	98	24	36	30	22	6	530	5.9
Percutaneous nephrolithotomy	0	4	10	364	318	336	318	304	246	170	2070	22.9
RIRS	0	0	0	0	0	0	0	2	40	80	122	1.3
ESWL	36	240	240	984	718	650	744	1104	890	712	6318	69.9
Total	140	314	280	1458	1134	1010	1098	1440	1198	968	9040	

ESWL: extracorporeal shock wave lithotripsy; RIRS: retrograde intrarenal surgery

Table 3. Distribution of ureteral stone management modalities within the time interval between 2005, and 2014 (incl.)

Bladder stone management modalities	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total	%
Open surgery	114	76	22	24	8	4	10	24	14	4	300	2.0
Semi-rigid ureterorenoscopy	130	210	580	1378	1530	1386	1444	1510	1660	1410	11238	73.6
Flexible ureterorenoscopy	0	0	0	0	0	0	0	4	22	44	70	0.5
ESWL	38	184	502	658	450	358	364	310	342	450	3656	24.0
Total	282	470	1104	2060	1988	1748	1818	1848	2038	1908	15264	

ESWL: extracorporeal shock wave lithotripsy; RIRS: retrograde intrarenal surgery

Table 4. Distribution of bladder stone management modalities within the time interval between 2005, and 2014 (incl.)

Bladder stone management modalities	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total	%
Open surgery	50	16	10	30	18	18	10	16	20	14	202	11.6
Endoscopic cystolithotripsy	104	126	112	182	180	156	162	156	202	158	1538	88.4
Total	154	142	122	212	198	174	172	172	222	172	1740

Figure 2. Distribution of renal stone management modalities within the time interval between 2005, and 2014 (incl.) **Figure 3. Distribution of ureteral stone management modalities within the time interval between 2005, and 2014 (incl.)**

in our country have been caught up with the level achieved in developed countries. Various methods have been used in the treatment of urinary system stone disease. In addition to follow-up, and medical treatment, ESWL, open surgery (pyelolithotomy, nephrolithotomy, anatomic nephrolithotomy, ureterolithotomy,

cystolithotomy), and endoscopic methods (PCNL, RIRS, URS, cystolithotripsy) can be applied. Open surgical methods can be preferred in the presence of structural anomalies (ureteropelvic junction stricture), larger staghorn stones, proximal ureter, and bladder stones.^[5]

Figure 4. Distribution of bladder stone management modalities within the time interval between 2005, and 2014 (incl.)

In our country PCNL was used by Sağlam et al. in the year 1987, and it has been used widely from then.^[4] In the year 2011, Gürbüz et al.^[6] performed a cross-sectional study in Istanbul, and reported PCNL applications in many clinics. Besides in the year 2008, in a study encompassing all hospitals in our country, it was reported that for the management of renal stones open surgery (39.1%), and PCNL (60.9%) had been used, and when compared with state hospitals, PCNL had been more frequently performed in training and research hospitals.^[7] In our study, even though, its application rate seems to be comparatively lower (22.9%), apparently PCNL has been used more frequently within the last 5 years in line with the decline in the incidence of open surgery (0.6% in 2014). Since many renal stones are smaller than 2 cm at the initial diagnosis, average application rate of ESWL in centers participating in our study was strikingly higher (69.9%). Generally speaking, on an average, as a treatment modality, ESWL was used in 38.3% of the patients with urinary system stones. We have observed that in our region, incidence of ureteral stones was at a high level (58.6%) where most of them (74%) were treated endoscopically. In our study, the incidence of open surgery for the management of ureteral stones was strikingly lower (2%). This phenomenon has demonstrated that most of the urologists used ureterorenoscope in their training during their specialization period or post-graduate courses, and applied this method prevalently. However, since stone treatment with flexible URS has been performed only for the last 3 years, very limited number of cases have been treated with URS. In a study performed by Güner et al.^[7] in the year 2008, the incidence rates for URS, and ureterolithotomy in our country were found to be 91.8, and 8.2%, respectively. When compared with the outcomes of our study, gradually lower rates of open surgery have demonstrated advancement in endourological interventions in our country.

Nowadays, bladder stones have been treated using open surgery, endoscopic lithotripsy, percutaneous cystolithotomy, and rarely ESWL. In our study, more frequent use of endoscopic cystolithotripsy (88%) in our region when compared with other

geographic regions of Turkey struck our attention. In some studies application of ESWL has been recommended for bladder stones smaller than 2 cm in size.^[8] However we have noticed that this treatment modality has not been performed in clinics which participated in our study. For the management of larger bladder stones open surgery or percutaneous cystolithotomy has been recommended.^[9] In our study median incidence of open bladder surgery was detected as 11.6% which demonstrates the presence of comparatively larger bladder stones in our region.

Flexible URS, has been prevalently used in the whole world following introduction of holmium YAG: laser into medical practice after 1980s.^[10] In order to avoid serious complications of PCNL in the management of renal stones flexible URS has become a treatment alternative for stones smaller than 20 mm, and resistant to ESWL. In our region RIRS has not been used prevalently because of higher installment costs, equipment failure due to insufficient experience, and its inadequate application in training and research hospitals in our country. However as a promising trend, the average application rate of 1.3% for the last 10 years has risen to 8.3% in the last year. Besides, we think that in line with decreasing purchase cost of flexible URS equipment, its widespread use, and increased amount of experience, RIRS will be used more frequently for the management of upper urinary system stone diseases.

Our study was performed based on data retrieved from a certain region, and limited number of hospitals which constituted one of the limitations of our study. If we consider that our country is not homogenous with respect to regions, and provinces, advances in the management of urinary stone disease do not reflect our country as a whole, and assessments of their reflections on the periphery will be a guiding tool for further evaluations. Larger scale studies performed in many centers will both allow popularization of these urological treatment modalities all over our country and also application in educational activities, and equipment planning.

Ethics Committee Approval: Due to the retrospective nature of this study, ethics committee approval was waived.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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