



The examination of the quality of life changes of patients with urolithiasis regarding different methods of treatment

Ispitivanje promena kvaliteta života bolesnika sa urolitijazom s obzirom na različite metode lečenja

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Abstract

Background/Aim. Urolithiasis is one of the most common urological illnesses with a continual rise in incidence and prevalence in the population. Its pathogenesis is multifactorial; hence, its consequences are serious problems that can significantly impact the quality of life of patients. In the last years, operational modes of urolithiasis treatment had undergone evolution changes towards minimally invasive treatment techniques aimed at improving its efficacy and patients' life quality. The aim of the study was to examine and evaluate the quality of life of the patients with urolithiasis depending on the applied treatment method. **Methods.** This research was designed as a panel study – a combination of a cross-sectional and cohort study. The sample included patients with urolithiasis treated with extracorporeal shock wave lithotripsy (ESWL) or ureteroscopic lithotripsy (Lithoclast). The research was carried during one year period and 100 respondents met the inclusion criteria. They were divided into two equal groups considering the applied method of the stone disintegration: the Lithoclast group (URSL) and the ESWL group. The instrument used for measuring the quality of life was Short Form (SF) 36 questionnaire. It was administered to the patients immediately before the operation and one month after the operation. **Results.** The statistical analysis of the scores obtained preoperatively on the SF 36 questionnaire revealed the decrease in the quality of life of patients with urolithiasis in almost all dimensions

of life. The statistically relevant difference in preoperative SF scores between the two groups of patients was not established except in the domain of the role of physical health and the domain of mental health. In the domain of the role of physical health, the Lithoclast group had a statistically significant higher score than the ESWL group, but in the domain of mental health, the ESWL group had a statistically significant higher score than the Lithoclast group. The postoperative statistical analysis of SF questionnaire and the examination of the impact of the treatment mode on the quality of life showed that the use of the Lithoclast method resulted in the much higher, statistically significant score at SF36 questionnaires regarding several life dimensions than the ESWL method. The application of the ESWL method even resulted in the decrease in the postoperational score for some life dimensions. **Conclusion.** The assessment of the quality of life is an adequate tool for the evaluation of treatment modes in the clinical practice. By using the SF 36 questionnaire in this study, we established that the ureteroscopic lithotripsy (the Lithoclast method) is a method that postoperatively results in much higher and statistically significant improvement of the quality of life of patients with urolithiasis in several health domains than the ESWL method.

Key words: urolithiasis; lithotripsy; quality of life; surveys and questionnaires; methods; treatment outcome.

Apstrakt

Uvod/Cilj. Urolitijaza je jedno od najčešćih oboljenja u urologiji sa stalnim porastom incidence i prevalencije u populaciji. Patogeneza ovog oboljenja je multifaktorijska, a za posledicu ima veoma ozbiljne probleme koji mogu imati značajan uticaj na kvalitet života ovih bolesnika. Tokom prethodnih godina, hirurški modaliteti lečenja urolitijaze

pretrpeli su evolutivne promene u korist minimalno invazivnih tehnika lečenja, postizanja bolje efikasnosti lečenja i poboljšanja kvaliteta života bolesnika. Cilj studije bio je da se ispita i proceni kvalitet života bolesnika sa urolitijazom u odnosu na pimenjenu metodu lečenja. **Metode.** Ispitivanje je dizajnirano kao panel studija (kombinacija studije preseka i kohortne studije). U studiju su bili uključeni bolesnici sa urolitijazom lećeni *extracorporeal shock wave lithotripsy* (ESWL)

ili ureterorenoskopskom litotripsijom (URSL aparat Lithoclast) u periodu od jedne godine. Sto ispitanika ispunilo je kriterijume za uključivanje u studiju. Ispitanici su podeljeni u dve grupe: Lithoclast grupa (URSL) i ESWL grupa. Kao instrument za merenje kvaliteta života korišćen je *Short Form* (SF) 36 upitnik koji su bolesnici popunjavali neposredno pre i jedan mesec posle operacije. **Rezultati.** Analizom skora SF 36 upitnika preoperativno ustanovljeno je da postoji smanjenje kvaliteta života kod bolesnika sa urolitijazom u gotovo svim dimenzijama života. Nije bilo statistički značajne razlike u preoperativnom SF skoru između dve grupe bolesnika izuzev domena uloge fizičkog zdravlja u kojoj je Lithoclast grupa imala statistički značajno viši skor od ESWL grupe i mentalnog zdravlja u kojoj je ESWL grupa imala statistički značajno viši skor od Lithoclast grupe. Statističkom analizom SF 36 upitnika postoperativno i ispitivanjem uticaja

modaliteta lečenja na kvalitet života, ustanovljeno je da Lithoclast metoda postiže statistički značajno viši skor SF 36 u nekoliko dimenzija života i značajno utiče na poboljšanje kvaliteta života u odnosu na ESWL metodu koja, postoperativno, beleži blagi pad u skoru za neke dimenzije kvaliteta života. **Zaključak.** Procena kvaliteta života dobar je način za procenu modaliteta lečenja u kliničkoj praksi. Primenom SF 36 upitnika u našoj studiji ustanovljeno je da je ureterorenoskopska litotripsija (Lithoclast metoda) modalitet lečenja urolitijaze koja postoperativno daje statistički značajno poboljšanje kvaliteta života u nekoliko domena zdravlja u odnosu na ESWL metodu.

Ključne reči:

urolitijaza; litotripsija; kvalitet života; ankete i upitnici; metodi; lečenje, ishod.

Introduction

Urolithiasis is a common illness resulting in serious health problems that significantly impact the quality of life of patients¹. This illness represents a group of metabolic and endocrine disorders in the organism that together with changes in the urinary tract lead to the formation of stones and incurrance of urolithiasis. The incidence of urolithiasis in the global population is around 12 %². Albeit it is found in all age groups, the highest incidence is among people in 3rd, 4th, and 5th decade of life. Moreover, it should be underlined that this illness is prone to recidivation. It is assumed that more than 50% of patients experience recidivation during the ten year period. Accordingly, urolithiasis is rightly labeled as „illness for the whole life“². The occurrence of urolithiasis is three times more common in men than in women³. In the clinical practice, urolithiasis is most commonly classified according to the size and anatomic localization of the stone, which decisively impacts the decision on the mode treatment, or more precisely, the selection of the stone disintegration method. Today, indications and application of minimally invasive urological techniques dominant in the treatment of calculus in everyday clinical practice are clearly defined^{4,5}. Extracorporeal Shock Wave Lithotripsy (ESWL) is a method of the stone disintegration by the shock waves formed outside of the patient's body. Subsequently, they are focused on the stone. Currently, it is the most commonly used stone disintegration method⁶. Ureteroscopic lithotripsy is a method that initially introduces a citoscope for the identification of ureter's orificium. Subsequently, a guide is used to introduce an ureteroscope to visualize and disintegrate the stone. For sure, these two methods had increased treatment efficacy and decreased the occurrence of complications. Today, they are primary modes of urolithiasis treatment⁷.

According to numerous studies, symptoms related to the existence of urolithiasis, illness complications, chronicity, recidivism, and different treatment modes represent external factors that can significantly impact the quality of life of these patients⁵. Regarding the quality of life, it must be

underlined that there is no widely accepted definition of this term nor the golden standard for its measurement⁸. However, the most common definition is the one proposed by the World Health Organization. Accordingly, it is an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns⁹. In the dictionary „Health for Everybody for the 21st century“, the quality of life is defined as a perception of individuals or groups that their needs will be recognized in time and met in order to achieve happiness and fulfillment¹⁰.

The term "the quality of life regarding health" describes the subjective satisfaction of an individual with his or her health status¹¹. In this case, the quality of life is a factor for exploration of the impact of the illness and treatment modes on an individual's health by integrating the objective assessment of the health status and subjective perception. Accordingly, the examination of the quality of life is a crucial factor that complements laboratory and diagnostic treatment of patients and contributes to the assessment of the illness flow and treatment mode of life and functioning of individuals. Undoubtedly, the introduction of the term quality of life in the medical sign has enabled the medical practitioners to perceive a patient as a complete person and to prevent the division between the patient's body and his or her personality. Currently, the incidence of chronic illnesses is on the rise. Accordingly, the number of patients who are long-term beneficiaries of health care system services is increasing as well. As a consequence, the interest for exploration of the quality of life has gained prominence among researchers, considering that, evidently, it is a valuable source of information about the flow, the success rate of the treatment modes, and the outcome of the illness. The purpose of this study was to assess the postoperative quality of life of patients with urolithiasis depending on the applied treatment method.

Methods

This research was designed as a panel study – a combination of a cross-sectional and cohort study. The sample in-

cluded patients with urolithiasis of the Urology Clinic of the Clinical Center of Serbia treated with ESWL or ureteroscopic lithotripsy (URSL apparatus Lithoclast), on the basis of the decision of the Calculosis Consilium, following the recommendations of the European Association of Urologists. Our research did not affect the decision of the Consilium on the applied method. The research was carried out between February 1, 2017 and February 1, 2018, and 100 respondents met the inclusion criteria. They were divided into two equal groups considering the applied method of the stone disintegration: the group 1 or Lithoclast Group (URSL) and the group 2 or ESWL group, each with 50 respondents.

The following criteria for inclusion in the study were: the patients with the diagnosis of urolithiasis older than 18 who gave consent to participate in the study and who were members of the group American Society of Anesthesiologist I-III (ASA I-III) classification. The study excluded patients who did not want to participate, patients with ASA score 4 and 5, individuals with heavy injuries and illnesses and heavy infections of the urinary tract, patients with hemorrhagic diathesis, and patients with contraindication (according to the recommendation of the European Association of Urologists) for performing one of those methods. The instrument used for measuring the quality of life was Short Form 36 (SF 36) questionnaire. It was administrated to the patients immediately before the operation and one month after the operation during the control checkup. This study used linguistically and culturally adapted and validated Serbian version of SF 36 questionnaire (Proqualid Patient-reported outcome Quality of life instruments Database SF 36 Health Survey Serbian Version accessed on 20 June 2012)¹². The patients filled it in independently; however, in the presence of a doctor whose role was to clarify the questions. SF 36 is an instrument for measuring individual perceptions of the overall health condition, the ability of functioning, limitations caused by emotional problems, limitations caused by physical problems, pain, fatigue, and problems in social functioning. The questionnaire consists of 36 questions divided into eight health domains regarding the 4-week period: physical functioning, limitations due to physical health, bodily pain, overall health, social functioning, limitations due to emotional problems, and mental health¹³. Answers in each domain were scored. The scale of answers was represented by numbers from 0 (the worst) to 100 (the best). Thus, the higher value indicated a higher quality of life – better physi-

cal functioning, better physical role, absence or lesser bodily pain, improved overall health, higher vitality, better social functioning, improved the emotional role and better mental health. The Cronbach analysis was used to test the reliability of the SF 36 questionnaire. More precisely, it tested the reliability of scales of given groups of the features. The testing confirmed the internal consistency of questions and reliability of the measurement instrument¹⁴. Descriptive and analytical statistic methods were used to analyze and present the obtained data. Concerning descriptive methods, absolute and relative numbers, measures of central tendency (arithmetic mean, median), and measures of dispersion were used (standard deviation). Also, the following analytical methods were used: tests of difference (χ^2 -test, *t*-test, Mann-Whitney *U* test) and correlation analysis. SPSS 21.0 (IBM) program was used for data analysis.

Results

An overview of the basic demographic characteristics of patients divided into groups is shown in Table 1.

The average age of respondents in this study was 50. The youngest respondent was 20 and the oldest 70 years. The sample included 60% of male and 40% of female respondents. Statistically significant differences regarding age and gender were not revealed. However, the data analysis demonstrated statistically significant differences regarding the value of body mass index (BMI). Concerning comorbidity, 46% of respondents did not report accompanying comorbidities, 32% reported hypertension, 11% diabetes, and 11% other accompanying illnesses such as angina pectoris, depression, rheumatism, and disorder of a thyroid gland. The statistically significant differences between the two groups were not noted (Table 2).

The significant distribution of patients by groups existed depending on urological diagnosis preoperatively. Hence, the kidney stones (renal calculi) were prevalent in the ESWL group, whereas ureteral calculus was more dominant in the Lithoclast group.

As shown in Tables 3 and 4, the statistically significant difference was noted regarding the localization of the stone and present symptoms of urolithiasis preoperatively. Calculus of urinary tract was accompanied by intense distress and symptoms requiring an adequate treatment (Table 4). According to the patients, the most unpleasant symptom of urolithiasis is renal colic, as it is very painful for each patient¹⁵.

Table 1

Demographic characteristics of patients with urolithiasis (n = 100)

Characteristics of patients	All patients	Lithoclast group n = 50	ESWL group n = 50	<i>p</i>
Age (years), mean \pm SD	50	51.04 \pm 12.70	50.20 \pm 10.30	0.717
BMI (kg/m ²), mean \pm SD	26.19	25.54 \pm 3.15	26.84 \pm 3.06	0.039
Gender, m/f	40/60	20/30	20/30	1.000
ASA 1	2	0	2	0.218
ASA 2	89	44	45	
ASA 3	9	6	3	

BMI – body mass index; m/f – male/female; ASA – American Society of Anesthesiologists; ESWL – extracorporeal shock wave lithotripsy; SD – standard deviation.

Table 2
The group distribution of patients by the diagnosis

Diagnosis	Lithoclast group n = 50	ESWL group n = 50	<i>p</i>
Calculus renis	19	49	
Calculus ureteris	29	1	< 0.001
Other	2	0	

ESWL – extracorporeal shock wave lithotripsy.

Table 3
Localization of the stone

Localisation	Lithoclast group n = 50	ESWL group n = 50	<i>p</i>
Kidney upper pole	13	16	
Kidney lower pole	9	33	
Proximal ureter	9	0	< 0.001
Distal ureter	18	1	
Urinary bladder	1	0	

ESWL – extracorporeal shock wave lithotripsy.

Table 4
The preoperative distribution of clinical symptoms of urolithiasis among patients

Symptoms	Lithoclast group n = 50	ESWL group n = 50	<i>p</i>
Asymptomatic	6	0	
Nausea	4	3	
Vomiting	2	6	< 0.001
Pain	28	15	
Renal colic	7	26	
Hematuria	1	0	

ESWL – extracorporeal shock wave lithotripsy.

The SF scale of answers was used for the assessment of the quality of life of patients preoperatively and postoperatively. The scale of answers was represented by numbers from 0 (the worst) to 100 (the best). Thus, the higher value indicated a higher quality of life (Table 5).

The statistical analysis of the preoperative SF 36 questionnaire revealed that patients with urolithiasis in both groups had lower SF 36 score of the quality of life in almost all dimensions or domains of health. The particularly low score was attained in the domain of physical functioning in the Lithoclast group. This score was statistically significantly lower in comparison to the patients of the ESWL group. The low scores were also noted in the following health dimensions: bodily pain, overall health, vitality, emotional role, and mental health. The statistically significant difference in the SF 36 score preoperatively was proven in the domain of mental health as well, as the ESWL group obtained a higher score than the Lithoclast group.

Considering the impact of the treatment mode of urolithiasis on the quality of life of respondents postoperatively, we established statistically significant differences in the patients' quality of life between two groups in several dimensions of health. Ureteroscopic lithotripsy has outperformed

the ESWL method in the following dimensions: physical functioning, a role of physical functioning, bodily pain, vitality, social functioning, and mental health. The patients in the ESWL group even experienced a lower SF score (the negative impact on the quality of life) in the following dimensions: mental health, vitality, social functioning, and the role of physical functioning. The exceptionally high statistically significant difference regarding the higher score (better quality of life), the Lithoclast group attained in three health domains: physical functioning, social functioning, and bodily pain.

Discussion

The demographic characteristics of the patients in this study regarding age, gender, BMI, the frequency of urolithiasis, as well as the most common and the most significant symptoms of the illness, correspond to the results of previous studies on urolithiasis. Until recently, only several studies examining the quality of life of patients with urolithiasis had been published¹⁶. The examination of the quality of life in urology started in 1992, following the recommendation of the American Urological Association to include questionnaires on the patients' quality of life in urological research.

Table 5
Results of the Short Form 36 (SF-36) questionnaire in the patients with urolithiasis

SF-36 domain	The type of performed intervention	Mean	SD	Median	<i>p</i>
Physical function preop.	Lithoclast	77.3	23.11	85	0.335
	ESWL	74.2	20.19	72.5	
postop.	Lithoclast	66.20	16.43	95	0.015
	ESWL	77–30	22–57	82.50	
Delta Physical function	Lithoclast	8.90	19.07	5.00	0.152
	ESWL	3.10	23.82	0.00	
Role physical preop.	Lithoclast	36.00	45.46	0.00	0.028
	ESWL	57.50	45.68	75.00	
postop.	Lithoclast	68.50	45.68	100.00	0.032
	ESWL	51.00	46.00	50.00	
Delta role physical	Lithoclast	33.50	45.63	0.00	< 0.001
	ESWL	- 6.50	38.07	0.00	
Body pain preop.	Lithoclast	53.14	20.57	52.00	0.520
	ESWL	52.88	27.59	31.00	
postop.	Lithoclast	66.20	18.38	67.00	0.002
	ESWL	52.32	23.35	52.00	
Delta Body pain	Lithoclast	13.06	19.84	12.50	0.001
	ESWL	-0.56	19.31	0.00	
General health preop.	Lithoclast	59.44	14.76	57.00	0.538
	ESWL	61.48	18.05	57.00	
postop.	Lithoclast	59.06	15.10	53.50	0.766
	ESWL	60.00	16.33	55.00	
Delta General health	Lithoclast	-0.36	7.33	0.00	0.546
	ESWL	-1.48	10.54	0.00	
Vitality preop.	Lithoclast	56.50	16.82	52.50	0.260
	ESWL	60.40	17.51	60.00	
postop.	Lithoclast	60.90	13.20	60.00	0.364
	ESWL	58.00	18.18	60.00	
Delta Vitality	Lithoclast	4.40	10.38	2.50	0.009
	ESWL	-2.40	14.79	0.00	
Social functioning preop.	Lithoclast	71.00	19.82	75.00	0.331
	ESWL	74.92	20.28	75.00	
postop.	Lithoclast	80.48	17.66	88.00	0.018
	ESWL	71.22	20.54	75.00	
Delta Social functioning	Lithoclast	9.48	18.20	12.00	< 0.001
	ESWL	-3.70	16.89	0.00	
Role emotional preop.	Lithoclast	40.68	45.84	0.00	0.059
	ESWL	57.32	46.21	83.50	
postop.	Lithoclast	76.00	43.14	100.00	0.066
	ESWL	60.66	47.00	100.00	
Delta Role emotional	Lithoclast	35.32	48.77	0.00	0.001
	ESWL	3.34	47.77	0.00	
Mental health preop.	Lithoclast	64.40	14.21	64.00	0.037
	ESWL	70.72	15.68	76.00	
postop.	Lithoclast	66.00	12.86	64.00	0.792
	ESWL	65.20	17.07	64.00	
Delta mental health	Lithoclast	1.60	10.35	0.00	0.001
	ESWL	-5.52	10.25	-4.00	

SD – standard deviation; preop. – preoperatively; postop. – postoperatively.

Initially, the research focused on patients with prostate and malignant illnesses, whereas the quality of life of patients with urolithiasis had remained unexplored due to a limited number of studies on this issue¹⁶⁻¹⁸.

According to the literature review, the majority of authors analyzes and evaluates the quality of life of individuals regarding the functional ability, degree, and quality of social interaction, mental wellbeing, somatic sensations, and life satisfaction¹⁸. However, the authors commonly argue that although objective assessment of health is important for the quality of life, also a subjective assessment of the health of the patient as well as his or her expectations of the treatment and the treatment outcome should be taken into account.

One of the most challenging aspects of measuring the quality of life is a quantification of all components and domains of health. To enhance the efficacy of measurements of different domains of the quality of life through specific questions, the fundamental measures were developed, namely, measures of psycho-physical condition and measures of the perceptions of sensations¹⁷. One of the instruments frequently used in practice is SF 36 questionnaire for the examination of the quality of life. In the recent years, several studies have used this questionnaire. The study of Donnally et al.¹⁸ examined the quality of life of patients with urolithiasis. Nine studies on 1,570 patients with urolithiasis also used SF 36 questionnaire as an instrument for measuring the quality of life¹⁹. In our study SF 36 questionnaire was also used, considering that numerous previous studies had confirmed its psychometric validity for measuring the quality of life²⁰. In this study, the statistical analysis of SF 36 scores preoperatively established that patients with urolithiasis in both groups had a lower quality of life in all dimensions or domains of health. In particular, the lowest score of the SF 36 questionnaire was attained pre-operatively in the domain of physical health in the Lithoclast group. This score was statistically significantly lower than the score of patients in the ESWL group. Accordingly, prior to the intervention, patients in the Lithoclast group had much more problems in work and in fulfilling daily activities due to lower physical health. The lower score was also noted in the following dimensions of health: bodily pain, overall health, vitality, emotional role, and mental health. The statistically significant difference in SF score between two groups preoperatively was also proven in the domain of mental health, as the patients from the ESWL group had higher scores than those of the Lithoclast group. More precisely, the patients from the ESWL group reported being nervous and felt less depressed. The results of this study are in line with those of the similar studies carried out abroad²¹. Seven studies on the quality of life of patients with urolithiasis confirmed the decreased quality of life¹⁹. Although there are variations among studies, it can be argued that patients with urolithiasis have a lower quality of life in comparison to the general population²²⁻²⁴. According to the study of Bryant et al.¹⁶, patients with urolithiasis have a significantly lower SF 36 score than the general US population in six out of eight domains of health. This study also confirmed that the SF 36 questionnaire is a valid instrument for assessment of the quality of life. However, a lack of the

baseline SF 36 questionnaire for the healthy population in Serbia poses a significant challenge for the researchers, as it is not possible to carry out comparisons. Considering the impact of the urolithiasis treatment mode on the postoperative quality of life of respondents, there is a lack of relevant studies. Moreover, the study results are varied and even conflicting^{23, 24}. Conclusion is that in spite of various treatment modes of urolithiasis and their high efficacy, further research in this area is needed to improve the postoperative outcomes of the models and the quality of life of patients^{25, 26}.

This study demonstrated through the statistical analysis of SF 36 questionnaire, filled in by the patients four weeks after the operation, that there is a statistically significant difference regarding the quality of life of patients postoperatively between two groups of patients (the treatment modes of urolithiasis) in several domains of health. With the higher score on SF 36 questionnaire, ureteroscopic lithotripsy outperformed the ESWL method in the following dimensions: physical functioning, the role of physical functioning, bodily pain, vitality, social functioning, and mental health. Concerning daily clinical practice, it was concluded that patients treated by ureteroscopic lithotripsy had fewer limitations in performing physical activities, fewer problems at work and other activities due to the physical health, reduction or elimination of bodily pain, and fewer problems in social functioning due to emotional and economic difficulties. Moreover, they were more vital and less nervous and depressed, unlike the patients in the ESWL group, who even experienced a lower SF score (the negative impact on the quality of life) in the following dimensions: mental health, vitality, social functioning, and the role of physical functioning. The exceptionally high statistically significant difference regarding higher score (better quality of life) the Lithoclast group attained in three health domains: physical functioning, social functioning, and bodily pain. This study showed that ureteroscopic lithotherapy as a treatment mode of urolithiasis is much more efficient than the ESWL mode. Moreover, it has a more positive impact on the quality of life of patients after the intervention.

Conclusion

The treatment of urolithiasis, its chronicity and the impact on the quality of life of those patients represents a challenging for selecting the right treatment mode. Indications and contraindications for performing the ESWL or ureteroscopy (URSL) are very similar and sometimes even identical, thus, posing a great challenging for the clinical practice. The assessment of the quality of life is a recommended method for the evaluation of treatment modes and it allows their measurement and comparison. The assessment of the quality of life-related to health enables the healthcare practitioners to perceive the patient not only as a carrier of illness but as a personality as well. The SF 36 questionnaire is a highly reliable tool for assessing the quality of life by measuring different dimensions. This study confirmed it as a valid measurement instrument. The study demonstrated that ureteroscopic lithotripsy is a treatment mode of urolithiasis that

postoperatively results in statistically significant enhancement of the quality of life of patients in several health domains in comparison to the ESWL method. Moreover, it provided the basis for further research with aim to establish

faster and more optimal decision-making process about efficient and safe treatment methods of urinary calculosis that should, besides healing, also improve the quality of life of patients postoperatively.

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Received on March 9, 2018.
Accepted on March 26, 2018.
Online First April, 2018.