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Predictors of Outcome for Extracorporeal Shock Wave Lithotripsy Among Patients with Renal Calculi: A Suggested Nursing Guidelines

DOAA A. IBRAHIM, M.Sc.*; BASSAMAT O. AHMED, D.N.Sc.*; HANY M. EL-FAYOUMY, M.D.** and AMEL S. MAHMOUD, D.N.Sc.*

The Departments of Medical Surgical Nursing, Faculty of Nursing and Urology, Faculty of Medicine**, Cairo University*

Abstract

Background: Renal calculus is the third most common disease of the urinary tract worldwide. Extracorporeal Shock Wave Lithotripsy (ESWL) has become the accepted first line treatment modality for renal and upper ureteric calculus. However, the selection of suitable candidates can optimize the outcomes of ESWL.

Aim of the Study: Is to investigate predictors of outcome for ESWL among patients with renal calculi as well to suggest nursing guidelines to prevent potential complications.

Material and Methods: A convenient sample of 100 male and female adult patients diagnosed with radio-opaque renal calculi ≤2cm constituted the study sample. The study was conducted in one of the Urology and Nephrology Hospital, Cairo-Egypt. Structured questionnaires and telephone interviews were developed by the researcher to collect data pertinent to the study using the following tools (1) Personal and medical background information form, (2) Modified numeric pain rating scale, and (3) ESWL predictors of outcomes assessment tool.

Results: Sample age ranged from 20 to 60 years with mean of 41.9±10.32. The majority of studied subjects were males and married with a percentages of (86%) and (85%), respectively. Half of the subjects had right renal calculi (50%), however, the majority had single calculi (76%), calculi size ranged between 7 to 20mm, with a mean of 12.28±3.5. Concerning final treatment outcomes, more than one third of the studied subjects had treatment success (36%). Major complications in the form of steinstrass and UTI were developed in (4%) and (3%), respectively.

Conclusion: The study concluded that calculi size was the only predictor of outcome for ESWL after one session.

Implications: Application of the suggested nursing guidelines to enhance patient's outcomes.

Recommendation: Replication of the study using a larger probability sample as well as a longer follow-up period for this group of patients.

Key Words: *Renal Calculi – ESWL – Outcome – Predictors of outcome.*

Correspondence to: Dr. Doaa A. Ibrahim, The Department of Medical Surgical Nursing, Faculty of Nursing, Cairo University

Introduction

URINARY calculus disease is reporting to be increased worldwide [1]. In fact, it affects 4% to 15% of the world population [2], and it's prevalence is rising worldwide including both genders in different age groups [3]. It carries high risk of recurrence after the initial episode; about 15% within a years and almost 50% within ten years [4]. Furthermore, renal calculi remains a major economic and health burden worldwide [5].

According to urology care foundation, [6] renal calculus attacks lead to more than 2 million health care provider visits and 600,000 emergency admission each year in United State of America (U.S.A). Moreover, the diagnosis, treatment of renal calculus and the lost time from work accounts for almost $5.3 billion. In Egypt urinary calculus diseases are considered the most painful urological diseases among Egyptian older adults, it is responsible for 45% of urological hospital admissions per year and account for approximately 800,000 elderly patient hospitalizations according to El-Sharqawy and Ewis study as cited in Mohammed, et al., [7].

Renal calculus disease affects people in the prime of live. Recurrent calculi formation may lead to decrease quality of life, interruptions in work and social commitments, increase utilization of health care, hospitalization, and even renal damage [8]. Furthermore, it may be complicated by pyonephrosis, septicaemia, pyelonephritis, hydronephrosis, renal failure and even death [9].

The treatment for renal calculi usually depends on the size, location, type, and number of calculus. Most of the patients spontaneously pass calculus less than 5mm in diameter, but, the probability of spontaneous calculus passage decreases as stone

size increases. Nevertheless, if the calculi does not pass spontaneously or if complications occur, there are many modalities for treatment including-though not limited to-oral calculus dissolution, endourologic methods, Extracorporeal Shock Wave Lithotripsy (ESWL), and surgical calculus removal **[10,11]**.

In the last two decades the treatment of renal calculus disease has changed dramatically with the improvements and miniaturization of instruments [12].Since the introduction of ESWL, it has been considered as the cornerstone of management of renal calculus due to its safety, simplicity, noninvasive characteristic, low complication rate, and allowing same day hospital discharge. It has become the most common first line treatment for the majority of renal calculus and more than 90% of urolithiasis cases are treated with it. In fact, the European Association of Urology (EAU) guidelines on urolithiasis state clearly that ESWL remains the first choice for treatment of calculus <2cm within the renal pelvis and upper or middle calices [13].

Outcomes of ESWL may differ from one patient to another and it depends on many factors such as calculi size, location, composition, habitus of the patient, and the efficacy of the lithotripter as well. Each of these factors has an important influence on the re-treatment rate and final outcome. Final outcome may be defined as treatment success or treatment failure. Treatment success includes free of calculi, or calculi fragments less than 4mm, while no fragmentation, or calculi fragments larger than 4mm, in addition to the development of post ESWL complications are indicators of treatment failure **[14]**.

According to King Fahd Registration Records at El-Manial University Hospital the average number of patients who had performed ESWL between 2012 and 2014 were 897 and this number is expected to increase. The actual effectiveness of this technique in helping those group of patients on the long run is a controversial issue among medical professions due to its high cost. Moreover, little researches has been conducted in this area to test the outcome of this technique, thus evaluation tends to be subjective.

Therefore, an investigation which provides information about the predictors of outcomes for ESWL might be useful to nursing as well as other health care professionals in several ways. It may be able to provide knowledge about the contribution ESWL might offer to those patients with ureteric and renal calculus. Professionals then, may wish to incorporate some of these essential elements of ESWL into already established treatment modalities, and to find ways to stimulate and facilitate the use of this technique as an adjunct to other treatment modalities. It is also hoped that this effort will generate attention and motivation especially among nurses for future investigations into this topic.

Aim of the study:

The aim of this study was to investigate predictors of outcomes for ESWL among patients with renal calculi as well to suggest nursing guidelines to prevent potential complications.

Research question:

To fulfill the aim of this study the following research question was formulated: What are the predictors of outcomes for ESWL among patient with renal calculi?

Subjects and Methods

Research design:

A descriptive/predictive research design was utilized in the current study.

Sample:

A convenient sample consisting of 100 male and female adults constituted the study sample. In addition, the following selection criteria were established, (A) Normal renal anatomy, and (B) Extracorporeal shock wave lithotripsy will be performed for the first time.

Setting:

Data collection of the current study was started in March 2016 and completed by the end of December 2016 at ESWL Unit in one of the Urology and Nephrology Hospital, Cairo, Egypt.

Tools of data collection:

A structured and telephone interviews were developed by the researcher to collect data pertinent to the study, the following three tools were utilized:

1- Personal and medical background information form, it was composed of two sections: The first section included personal data such as age, gender, level of education, occupation, marital status...etc. While, the second section included medical data such as height, weight, BMI, vital signs, current diagnosis, past medical history...etc.

2- Modified Numeric Pain Rating Scale (NRS-11) by Melzack: It is patient self-reporting of pain with the following rating system: (0) no pain,

(1-3) mild pain, (4-6) moderate pain, (7-10) severe pain. The investigator added to Melzack's tool another six items for pain assessment they are: Pain site; onset; duration; radiation, and alleviating and aggravating factors. It was completed immediately after the session and by telephone call day after day for two weeks after the procedure.

3- Extracorporeal Shock Wave Lithotripsy Predictors of Outcomes Assessment Tool (ESWL-POA). The tool was composed of two sections: The first section included data pertinent to predictors of outcomes such as calculi side, number of calculus, calculi site, type of calculi, calculi size,...etc. While, the second section included data pertinent to side effects such as nausea, vomiting, diarrhea, hematurea, bruises...etc; complications and final treatment result as well; it is completed day after day for two weeks after the session through a telephone call.

Tools validity and reliability:

Content validity of the developed tools was tested by subjecting the tools to a panel of five faculty members experts in the urology, nephrology, and nursing fields. Each expert was asked to examine the instrument for content coverage, clarity, and whether the included items are suitable to achieve the aim of the current study. Cronbach's Alpha was used to test the reliability of the tools and it showed satisfactory level for Pain Assessment Tool and the Extracorporeal Shock Wave Lithotripsy Predictors of Outcome Assessment Tool (ESWL-POA) (0.877 & 0.843, respectively).

Ethical consideration:

Primary approval was obtained from the Research and Ethics Committee of Faculty of Nursing, Cairo University. Also an official permission was obtained from hospital/units administrators to conduct the study Each participant was informed about the purpose of the study and its significance. The subjects were informed also that participation in the study was completely voluntary, as well as they have the right to withdraw from the study at any time without any penalty. Additionally, all participants was assured that their anonymity and confidentiality will be guaranteed through coding the data. Moreover, participants were informed that the data will not be reused in another research without their permission. Subjects who choose to participate were asked to sign the consent form.

Pilot study:

A pilot study was conducted on 10% of the sample to test feasibility of the study, as well as to examine issues related to the design, sample size, data collection procedures, and data analysis approaches. The pilot sample was included in the study.

Procedure:

Once official permission was granted to proceed with the proposed study, the investigator initiated data collection. Names of potential subjects who met the criteria for possible inclusion in the study were obtained daily from the head nurse of ESWL Unit. Before the procedure, and while potential subjects were waiting in the waiting area they were approached by the research investigator. At that time, the purpose and the nature of the study, as well as, the follow-up schedule were explained; additionally all other ethical considerations mentioned previously were assured, too.

Then, all subjects who choose to participate in the study were asked to sign the consent form. During initial structured interview and after the consent form has been signed the investigator completed the personal and medical background information form. After that and while the patient was undergoing the procedure the investigator checked the patient's file to complete data pertinent to the first section of ESWL-POA tool with exception of items number eight and nine that were completed at the end of the procedure.

Right after the procedure and before being discharged from the unit the investigator visited the patient once again to assess pain level using modified NRS-11. To inquire about the outcome of the procedure the investigator followed the patients day after day for two weeks after the procedure through telephone calls in order to fulfill data related to second section of ESWL-POA, as well as modified NRS-11.

Two weeks post procedure and when the patient came back to perform KUB X-ray according to the Unit Policy, the investigator met the patient for the third time to complete data related to the second section of ESWL-POA tool which consists of three items which were CT scan result if requested for complicated cases, date of KUB X-ray, treatment result/or session outcome based on KUB X-ray result.

Statistical analyses:

Obtained data were tabulated, computed and analyzed using Statistical Package for the Social Sciences (SPSS) program Version 20. Descriptive and Inferential statistics were utilized; descriptive statistics included frequency, percentage distribu-

tion, mean and standard deviation. On the other hand, inferential statistics included multinomial logistic regression which used to study the effect of predictors on the treatment outcome, predictor is significant if the *p*-value is ≤0.05.

Results

According to personal and medical background information, the common age group fall between 41-50 years with a mean of 41.9±10.32 years. The studied subjects were predominantly males and married (86% and 85%, respectively). As regard education and employment status, half of the subjects had university education and employed (50% and 89%, respectively). Moreover, less than two third of the studied subjects resides in urban areas (61%).

With reference to the medical data, (23%) of the studied patients had hydronephrosis, hence, pretreated with D-J stent. Regarding calculi side it was equally distributed between right side and left side (50%). In relation to the number of the calculi, the majority of the studied sample had single calculi (76%). Furthermore, more than one third had calculi in the lower calyx (40%). The predominant calculi composition was Ca oxalate (44%), while (41%) of calculi composition was not available. On the other hand, the calculi size for half of the studied patients ranged between 10 to 14mm. The majority of the studied patients (89%) treated with 3000 shock wave per session.

Table (1) proclaimed that, pain was manifested in a variant degree at the day of session among the studied patients with a percentage of (73%), then started to decrease day after day until the end of the first week, where only (6%) still had pain. By the end of the second week only (2%) had pain. In relation to pain duration, more than one third of the studied subjects (37%) had pain which ranged between minutes to less than one hour.

Table (2) provided a comparison between the first and second weeks as regards ESWL outcome. It is apparent from the table that, there were a highly statistical significant difference in nausea, vomiting, loss of appetite, itching, bruises, hematurea, change in urination pattern, and pain between the first and second week after ESWL with the following *p*-value (0.001, 0.0001, 0.0001, 0.01, 0.0001, 0.0001, 0.0001, and 0.0001, respectively). On the other hand it highlighted that, there is no statistical significant difference as regard diarrhea, constipation, steinstrass, and UTI between the first and second week after ESWL session.

Table (3) pointed out to the treatment outcomes during the entire two weeks post-ESWL among the studied patients. It is clear from the table that, about one third had treatment success after the first session (3 6%) in the form of (23%) had calculi free, and (13%) had fragments smaller than 4mm. Nonetheless, two third had treatment failure (64%) in the form of (59%) had fragments larger than 4mm and scheduled for other sessions; and the rest had no fragmentation.

Table (4) indicated that, calculi size was the only predictor of outcomes for ESWL among the studied subjects with a high *p*-value of (.010).

Table (1): Frequency distribution of pain throughout follow-up period among the studied sample (n=100)*.

Pain \ Days	Session day	1st day	3rd day	5th day	7th day	9th day	15th day
Pain score:							
Mild (1-3)	24	20	12	05	01	0	0
Moderate (4-6)	40	20	11	07	02	02	01
Severe (7-10)	09	05	05	02	03	01	01
X	0.83±1.11						
Pain site:							
Right flank	38	22	12	06	01	0	0
Left flank	35	23	16	08	05	03	02
Pain onset:							
Gradual	53	37	21	10	04	03	02
Sudden	20	08	07	04	02	0	0
Pain duration:							
<1 hour	37	37	22	12	04	03	01
1 hour >2 hour	17	02	02	01	01	0	0
2 hours >3 hours	15	04	02	0	0	0	0
≥3 hours	04	02	02	01	01	0	01
Pain radiation:							
Suprapubic	04	04	04	02	0		
Scrotal	04	05	02	01	0		
Suprapubic and scrotal	01	01	01	0	01		
Penile	01	01	01	01	0		
Ureteral and suprapubic	02	02	01	02	01	1	1
Ureteral and scrotal	0	01	01	0	01	1	

*: Total numbers of patients are different, as not all patients experienced pain.

Table (2): Chi-square comparing the outcomes of ESWL (side effects and complications) in the first and second weeks post ESWL session among the studied sample (n=100).

Side effects and complications	First week	Second week	Total *	χ^2	*p*-value**
	No. (%)	No. (%)			
• Nausea	24	05	29	9.6	0.001**
• Vomiting	18	03	21	8.00	0.0001**
• Loss of appetite	25	05	30	11.57	0.0001**
• Diarrhea	09	02	11	3.60	0.06
• Constipation	13	05	18	3.56	0.06
• Itching	12	01	13	7.36	0.01**
• Bruises	12	01	13	10.29	0.0001**
• Hematurea	81	03	84	74.2	0.0001**
• Change in urination pattern	61	22	83	19.32	0.0001 **
• Steinstrass	02	02	04	0.00	1
• UTI	02	01	03	0.33	0.56
• Pain	73	03	76	64.47	0.0001 **

*: Numbers are different for the following reasons: (A) Not all patient experienced side effects or complications, and (B) Total reflects subjects giving more than one answer.

Table (3): Frequency and percentage distribution of treatment outcome at the end of two weeks follow-up among the studied sample (n=100).

Treatment outcomes	N (%)
Treatment success:	
Calculi free	23
Fragments ≤4mm	13
Total	36
Treatment failure:	
Fragments ≥4mm and scheduled another session	59
No fragmentation and scheduled another session	05
Total	64

Table (4): Multinomial logistic regression with predictors of outcomes for ESWL among the studied sample (n= 100).

Predictors	Effects	
	χ^2	*p*-value
Age	2.951	.399
BMI	6.459	.091
Calculi size	11.339	.010*
Gender	5.898	.117
Pre ESWL D-J stent	6.945	.074
Calculi site	1.875	.931
Calculi composition	9.320	.675
Number of shock waves	9.834	.364
Kidney morphology	4.863	.561
Calculi side	.505	.918
Calculi number	6.808	.078

*: $p \leq 0.05$.

Discussion

The current study delineated that, the age of the studied subjects ranged between 20 to 60 years and the age of less than one third ranged between 41 to 50 years with a mean of 41.9 ± 10.32. This result was supported by Wazir et al., **[15]** who reported that, the age of their studied subjects ranged between 20 to 60 years, and the age of one third (33.6%) ranged between 31 to 40 years with a mean age of 40.15 years. While, Joshi et al., **[16]** reported that, the mean age of patients with renal calculus was 37.2 years and it ranged between 14 to 85 years. This findings could be interpreted in the light of the fact that renal calculi affect different age groups.

In relation to gender in the current study, overwhelmingly the majority of the studied subjects were males. This result was congruent with Pal and Puri study **[17]** and Chen et al., **[18]** who revealed that, two third of their studied subjects were males (66.67% & 69.7%, respectively). This findings could be explained in the light of the fact that, men had large muscle mass as compared to women, thus, the daily breakdown of the tissue results in increased metabolic waste hence predisposition of calculi formation.

Regarding marital status, most of the studied subjects were married. This result was supported by Mohammed et al., **[7]**. The researcher explained this finding as renal calculi commonly affect people in the prime of life in which they were married. The fact that half of the participants had university education could be explained as the majority of the subjects were from urban areas. This result was consistent with Bakunts study **[19]**, who pointed out that, less than one third of their participants had university education (30.2%). On the other hand, the current finding is controversial with Mohammed et al., **[7]** as it depends on the site/region from which the study sample were drawn.

In the current study, the majority of studied subjects were employed. This finding could be interpreted in the light of prolonged time spent out in work without drinking enough amount of fluids as well as delaying the passage of urine. This result was consistent with Bakunts **[19]** who pointed out that, the majority of participants were employed (77.0%).

In relation to medical background information and pre-ESWL management, the present study elucidated that, the majority of the studied subjects had normal kidney morphology, and less than quarter had hydronephrosis, though, pretreated with the insertion of D-J ureteral stent. This finding was congruent with Al Marhoon et al., **[20]** study who illuminated that, prior ESWL, more than one third of their studied subjects treated for renal calculus had double-J stent (34.9%). On the other hand, this finding was incongruent with Choi et al., **[21]** who revealed that, the majority of their studied subjects had hydronephrosis (74.05%).

Concerning calculi side locale, the result of the current study revealed that, the calcului were almost equally distributed between the right and the left kidney. This result was supported by Chen et al., **[18]** who reported that, more than half of the studied subjects had the calculi in the left kidney (53.8%), while the rest had it in the right kidney (46.2%).

Regarding calculi site within the kidney the present study tribute that, more than one third of the studied sample had the calculi in the lower calyx and in the renal pelvic, respectively. The current finding incomparable with a published research article by Celik et al., **[22]** who pointed out that, less than two thirds of their participants had the calculi in the renal pelvis (65.5%), and (18.5%) in lower pole.

In the present study, calculi composition was available only for (59%) of the studied subjects.

Calcium Oxalate (CaOx) calculi turned to be the most frequent type as it occurred in more than one third of the studied subjects, this was followed by uric acid calculi. This finding is congruent with Lee and Bariol [23] study who stated that " calcium oxalate is the dominant composition followed by uric acid calculi". Furthermore, Moreira et al., [24] demonstrated that, (55%) of their studied subjects had CaOx calculi, and less than quarter had uric acid calculi (21%). These finding is consistent with what was reviewed in the literature that, CaOx is the most common type as it accounts about 70% of the urinary calculi Daudon et al., [25].

As regard calculi size, it ranged between 7 to 20mm, with a mean of 12.28 ±3.5, moreover, the calculi size for half of the studied subjects ranged between 10 to 14mm. The result of the current study supported by Akbar et al., [26] who cited that, calculi size in their studied subjects ranged between 7 to 20mm, with a mean of 14.6 ±3.8mm. The possible explanations for this range of the size could be that calculus less than 5mm could be passed spontaneously and asymptomatically, while, a larger calculus might obstruct the ureter and block the flow of urine causing renal colic, nausea and vomiting.

Concerning side effects and complications, the current study demonstrated that, hematurea and change in urination pattern were the most common side effect that lasted the whole two weeks, this was followed by gross flank pain which was managed successfully by analgesics and hydration in (4%) of the participants. This result was consistent with Salem et al., [28] and Al-Marhoon et al., [20] studies who reported that, flank pain was the most frequent side effect after ESWL, followed by macroscopic hematurea. Moreover, change in urination in the form of urgency and frequency could be interpreted in light of the passage of the calculi fragments and the presence of D-J stent which irritate the lower urinary tract. Furthermore, as indicated in the literature that, hematurea might be occurred as a result of kidney injury.

The current study revealed also that, less than one third of the participants had nausea, this was followed by loss of appetite, vomiting, constipation, bruises, itching, and diarrhea. Moreover, complications were less common after ESWL, and it mainly occurred in the form of steinstrass and UTI. This finding was inconsistent with Salem et al., [28] who noted that, steinstrass was the third most common complication; it was developed in less than one third of their participants (30.9%). The cause of a such finding might be interpreted in light of the significant correlation between size and the location of the treated calculus.

With reference to treatment outcome two weeks post ESWL session, the current study detailed that, more than one third of the participants had treatment success, in form of calculi free, and fragments smaller than 4mm, however, the large majority had treatment failure in the form of fragments larger than 4mm or no fragmentation, hence, will require additional session. The cause of a such finding could be interpreted in light of the methodological differences such as sample size, geographical location from where the sample drawn up, and follow-up period. This finding wasn't in the same line with Chan et al., [29] who reported that, less than two thirds of their studied subjects who treated with ESWL had treatment success after one session (63%).

With respect to predictors of outcomes after ESWL the current study revealed that calculi size was the only predictor after the first session among the studied patients with a high p-value of (.001). Calculi free rate was (50%, 20%, and 10% for calculus <10mm; 10-15mm; and >15mm, respectively). The reason of a such finding could be interpreted in the light of the fact of limited number of the patients, limited number of session, short period of follow-up as it was only for two weeks. In addition to that, calculi composition was unavailable in more than one third of the studied subjects.

The current result was similar to Badran et al., [30], Joshi et al., [16], Neisius et al., [31] and Ghimire et al., [27] as they revealed that, calculi size was the most significant predictor in determining success of ESWL. However, the current result inconsistent with the latter study as they showed that, calculi free rate for renal calculi was (92% and 85% for calculus <10mm and calculus ≥10mm, respectively). In the same context Badran et al., [30], indicated that, calculi free rate was (92.39% and 77.2% for calculus less than 10mm and calculus larger than 10mm, respectively).

On the other hand, the current finding was incongruent with Celik et al., [22], Hameed et al., [32], and Sultan et al., [33] as the authors indicated that, Hounsfield (HU) value of the calculi might be used as a significant predictor for calculi composition, the numbers of shock waves and sessions required for success of ESWL. And they clarified that the higher the HU values, the stronger the energy, and the more the numbers of shock waves and sessions required to achieve fragmentation.

This discrepancy could be explained in the light of the fact that, HU value couldn't be used as a predictor in the current study, because it measured only by CT scan and not all patients were routinely evaluated by using it.

Conclusion:

Renal calculus or urolithiasis is increasing day by day due to different life style as well dietary habits. Currently, ESWL is one of the preferred treatment modality for calculus in the upper urinary tract since its introduction due to its noninvasive character, favorable clinical outcome, low complication rate and a few absolute contraindications **[12]**. However, not all kidney stones are amenable to treatment by ESWL. The success rate of ESWL depends upon various factors like calculi size, calculi density and composition, location of the calculi, renal morphology, congenital anomalies **[14]**. Therefore it is very important to estimate the probability of stone clearance for each individual so as to determine who will experience maximum benefit from ESWL **[27]**. Based up on the finding of significant association (.010) between calculi size and the outcomes of ESWL. It seems reasonable to conclude on the basis of these findings that, calculi size was the only predictor of outcomes for ESWL after the first session. Moreover, hematurea, flank pain, and change in urination pattern were the most common side effects reported after ESWL session.

Implications:

Integrations of the suggested nursing guideline developed by the research investigator in order to enhance patient's outcomes after ESWL, the developed guidelines cover the following areas:

A- Nursing guidelines before, during, and after the ESWL procedure.

B- Nursing interventions to prevent the recurrence of renal calculi.

Recommendations:

A- Replication of the study using a larger probability sample acquired from different geographical areas.

B- A longitudinal study should be designed over a longer period of time to determine the long term effect of ESWL management.

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التنبؤات نتيجة الموجات الصادمة من خارج الجسم لتفتيت الحصوات بين المرضى الذين يعانون من الحصوات الكلوية وإقتراح إرشادات التمريض

لا تزال الحصوات الكلوية تشكل عبئا إقتصاديا وصحيا كبيرا فى جميع أنحاء العالم. ويمتد علاج الحصوات الكلوية ما بين الإنتظار المتيقظ لنزول الحصوة وإجراء العمليات الجراحية المفتوحة. قبل ظهور الموجات الصادمة من خارج الجسم وغيرها من الإجراءات التداخلية الصغرى مثل منظار الحالب وإستئصال الحصوة الكلوية عن طريق فتحة بالجلد، كانت الجراحة المفتوحة تمثل العلاج الأمثل لمعظم حصى الكلى والحالب. وفى الآونة الأخيرة، غيرت الموجات الصادمة من خارج الجسم طرق علاج حصى الكلى والحالب بشكل كبير حيث أصبح تفتيت الحصوات بالموجات الصادمة من خارج الجسم إجراء بسيط، مريح، مناسب، وآمن، كما أنه يجرى بالعيادات الخارجية. ولم يقتصر ذلك على تقليل وقت الإستشفاء والإعتدال فحسب، بل إنه أيضا فعال من حيث التكلفة.

تعمل الموجات الصادمة على تفتيت الحصوة الكلوية إلى شظايا صغيرة. ويمكن لهذه الشظايا الصغيرة أن تمر مع البول فى غضون أيام أو أسابيع. كما أن تفتيت حصوات الكلى بالموجات الصادمة من خارج الجسم له مضاعفات مثل أى إجراء من إجراءات المسالك البولية الأخرى ومن أهم هذه المضاعفات إنسداد وعدوى الجهاز البولى. وأشارت العديد من الأبحاث أن معدل نجاح هذا الإجراء يعتمد على عوامل مختلفة مثل حجم الحصوة، مكان الحصوة. وذلك لتحديد من سوف يتمتع بالإستفادة القصوى من هذا الإجراء، والحد من الآثار الجانبية والمضاعفات المحتملة بعده.

ولذلك، كان الهدف من هذه الدراسة هو التعرف على متنبئات نتائج التفتيت بالموجات الصادمة من خارج الجسم بين المرضى الذين يعانون من حصوات الكلى وإقتراح إرشادات تمريضية للحد من المضاعفات المحتملة فى واحدة من مستشفيات الكلى والمسالك البولية فى القاهرة، مصر. وقد تم إستخدام تصميم البحث الوصفى/التنبؤى فى الدراسة الحالية. ولتحقيق الهدف من الدراسة إستخدمت عينة بحثية متاحة شملت مائة من الذكور والإناث البالغين الذين تراوحت أعمارهم بين ٢٠ إلى ٦٠ عاما، قد تم تشخيصهم بأنهم يعانون من حصوات كلوية معتمة حجمها ≥2سم فى القطر، مع الهيكل الكلوى الطبيعى، كما أنهم يخضعون لإجراء الموجات الصادمة من خارج الجسم للمرة الأولى.

وقد تم جمع البيانات بإستخدام الأدوات الثلاثة التالية: (أ) نموذج معلومات الخلفية الشخصية والطبية. (ب) مقياس تقييم الألم الرقمى المعدل والمكون من ١١ نقطة، (ج) أداة تقييم متنبئات تفتيت الحصوات الكلوية بالموجات الصادمة من خارج الجسم. وكانت أهم النتائج: أن حجم الحصوة هو المتنبأ الوحيد لنتائج الموجات الصادمة من خارج الجسم بعد الجلسة الأولى بين المرضى الذين تمت دراستهم، كما وجد أن التغير فى نمط التبول، البول الدموى، والألم كانوا أكثر الآثار الجانبية شيوعا خلال أسبوعين بعد الجلسة.