

EVALUATION THE ROLE OF DIURETICS IN INCREASING THE EFFECTIVENESS OF ESWL

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ABSTRACT

In this project, we seek to answer the question whether the use of diuretics with EWSL method can be effective or not. In this regard we selected 120 people who was suffering from kidney stone and referred to Shahid Rejaei hospital in Ghazv in province, we divided them in to the two 60 person group, we did EWSL for the first group only by ESWL and for the second group following EWSL, and also we used diuretics.

INTRODUCTION

Kidney stones are considered the most common urological disease in the United States. Therefore, selection of appropriate treatment is very important and necessary. There are several methods for lithotripsy including open surgery, extraction Ureteroscopy, lithotripsy Ureteroscopy and extracorporeal shock wave lithotripsy (ESWL. Currently ESWL methods are approved as the Gold Standard treatment method for Upper Urinary Tract Stones. It should be noted that a patient may require several ESWL sessions and sometimes surgical intervention may be necessary. The success of this method depends on several factors that include:

- Stone Size
- The degree of created obstruction
- The patient kidney function and...

The ESWL procedure has been welcomed by doctors and patients, since using it will have many benefits. Reducing the need for hospitalization, less pain and speed up the return to work is important for the patient and doctor.

The ESWL procedure to remove kidney stones may benefit from four mechanisms:

- Compressive Fracture
- Spallation
- Dynamic Fatigue
- Acoustic Cavitations

Whereof such methods the Acoustic Cavitation are particularly important in the mechanism of lithotripsy because doubled energy that is Pitting In foil will be added. In this procedure, a probe is placed on the outer surface of the body and by sending ultrasound waves break up stones in the ureter. Transmitted wave In terms of intensity and power are incremental in which its advantage of the loss of skin sensitivity, and resulting in less damages.

As noted several advantages of ESWL, such as less invasion, reducing length of hospitalization, lower costs for the patient and the health care system, endure less pain to the patient and also increasing the rate of return to work, make the procedure as the first -line therapy in lithotripsy. It is noteworthy that following the widespread use of ESWL for the treatment of upper Urinary Tract Litanies, using of aggressive treatment such as Open Surgery and Endure logical Procedure has declined, but the ESWL resolved the restrictions of applying these methods. ESWL also has its own limitations and consequences, and following global expansion of this method, attracted the interest of many researchers. It should be noted that patients should be prepared for ESWL, it include enough Hydration and preventing from constipation. Dehydrated Patients and those who were suffering from constipation will be less satisfied in the end of ESWL; because dehydration decreased enough urine flow around the targeted stone. Among the solutions proposed to establish an adequate flow of urine around the targeted stone, is prescription of

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diuretics, and following it the Cavitations phenomenon which is the most important mechanisms in lithotripsy in ESWL is reinforced.

Another benefit of hydration would be a survey conducted in the High Speed Films. The study has shown that the process of destruction of stones depends on the time in which the first crack created by shock wave and following it, fluid around the targeted stone penetrate in the cracks and the Collapsing Cavitation Bubble method led to the destruction of stone. Possibly taking diuretics can also be helpful in the effectiveness of this method. According to the studies mentioned, ESWL has high efficacy and low side effects and that is why it selected as a choice treatment of kidney stones. Because this method provides good results and the side effects are acceptable.

Previous Studies

Numerous studies are carried out in this field Considering the importance and prevalence of disease in this research and different treatment method, and we evaluate them in brief as follows: Sakorafas *et al.*, (2013) in their study, assess the obstructive diseases which is one of the problems of the urinary system. they believe the prevalent features of urinary system obstruction is dilation, and this is usually an ultrasound finding but dilation in urinary system always does not indicates on dilation but may have another symptom such as reflex and vesicoureteral or abnormal evolution of urinary system, or even after surgical treatment of obstructive dilation remain by dilation lithotripsy in a atonics system. In this technique, demography diuretic can be an effective method for differential diagnosis of mechanical dilatation due to non mechanical causes. The results indicate a high sensitivity of diuretic demography in the differential diagnosis of obstructive urepatyfrom no obstructive urepathyof such benefits of this approach, simplicity, low cost, non-invasiveness and patient low exposures is noted. Therefore, this method could be used easily to separate the dilatation model with mechanical obstruction of dilatation without mechanical obstruction to diagnose obstructive cases that require quick treatment action in order to prevent progressive kidney damage or apply proper evaluation of the rate of success in resolving Obstruction treatment techniques.

Cahen *et al.*, (2012) examined the treatment of stone smaller than 20-25 mm kidney and the ureter with ESWL. The results of these studies show that the ESWL is successful in treatment of stones smaller than 10m.m but it is not suitable in treatment of stone bigger that 10 mm, although need further study.

Thomas *et al.*, (2010) examined the ESWL which was she most prevalent obstruction and causes kidney colic uretrohydronephrosis. They believe, in case of lack of success in medical treatment for inferior ureter , the ESWE or TUL could be used. This research is carried out , in order to compare ESWL and TUL, 60 patient who was not answer to medical treatment. The results indicates that the TUL method in treatment of ureterolith considering high success , low complication, low cost and high lithotripsy and in one hand ,lower success , the ESWL is preferable as choice treatment in uretherolitotomy. Tanden *et al.*, (2010) studied the urinary calculus which is the third prevalent disease of urinary tract. They stated that 90% of kidney stone are curable with 66-68 % by ESWL. But One of the most serious and rare complications of this method is acute pancreatic. They studied the pancreas following ESWL . Their results suggest that in spite of immunity of ESWL waves , it is suggested that in order to early diagnosis of acute pancreas, the serum level of .amylase or serum lipase be measured after right kidney lithotripsy.

Research Hypothesis

Diuretics are effective in removal of urinary calculus following ESWL.

Research Design and Methods

Data about patients will be collected using a questionnaire and patients are randomly divided into 2 groups. The first group received 40 mg of furosemide and control group will receive any diuretics. It should be noted that patients do not have contraindications to receive furosemide, simultaneous use of other diuretics, blood pressure and heart disease should be considered. The drug dose is as a BD (furosemide mg 40, 2 times a day) is. Size, location and type of stones are assessed at the beginning of treatment, and patients again are evaluated after 1 month of taking the drug

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RESULTS AND DISCUSSIONS

After random selection of statistic population in two independent groups and examination of the sample, and filling the questionnaire, the descriptive and inferential analysis was carried out. Descriptive statistics of the project, the two-variable of gender and age have been examined. We evaluate the descriptive statistics of these two parameters.

The total number of participants in the project are 120 patient, in which the descriptive statistics obtained from this parameter indicates that 49 patient were women, which is equivalent to 40.8% and 71 patient were male, which is equivalent to 59.2 percent. Therefore, we found that the probability of occurrence of kidney stones in men is more than women.

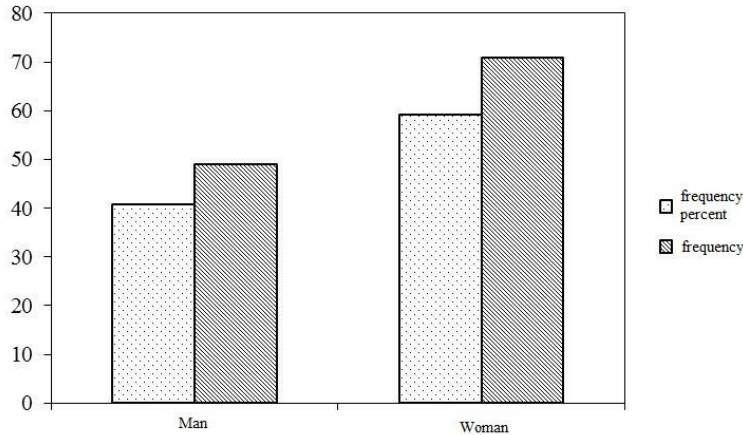


Figure 1: Frequency of sex

Results Descriptive statistics are presented in the table below the age parameters. The results of descriptive statistics about age parameter are shown in following table. The results show that the subjects of the study are in the age range of 18 to 82 years, and this testifies to the fact that kidney stones are common in all age groups on the other hand the average age of these subjects are 42 year which is consistent with the results of other researchers and they unanimously agreed that in middle age there is high possibility of kidney calculus occurrence. But the results of the study show that in this study, most people who are suffering from this disease, and examined subjects, are 27 years old. By evaluation of the parameters of gender, and age, we found that kidney stones are more common in men and in middle age and the incidence of the disease in males are among 40-45 years. On the other hand, the results of descriptive statistics show that the population used in this project, has the appropriate extend due to their age and gender and the results of this project can be extracted with a high degree of confidence.

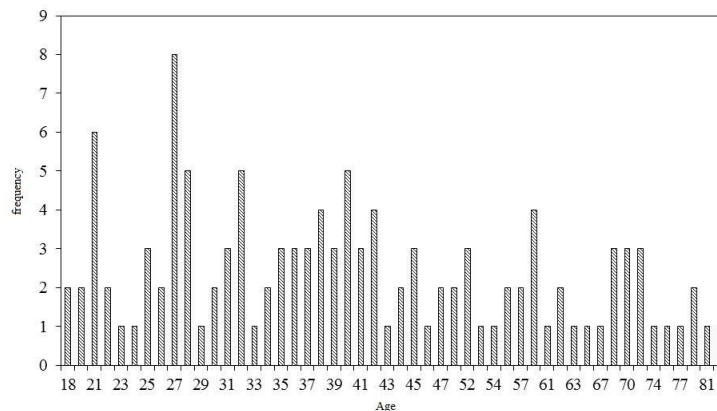


Figure 2: Frequency of age

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Inferential Statistics

Removal Chance

After examining the descriptive statistics, we consider the inferential statistics. First, the number and percentage of kidney stones removal are analyzed for those people who have used the EWSL method without / with diuretics. the results show that in general lithotripsy in men are carried out less than women , meanwhile the prevalence of this disease among men are more than women. But the hope is that by using EWSL with diuretics, the risk of lithotripsy significantly increases, So that in men using diuretics could increases the risk of lithotripsy from 42 percent to 68 percent, which means that using diuretics by EWSL can increase the lithotripsy 1.6 times in men.

On the other hand, in women using diuretics by ESWL, the lithotripsy increased from 59 percent to 68 percent and testify the fact that using of diuretics, increase the risk of lithotripsy 1.3 times in women. So in general, the risk of lithotripsy is higher in women and by using of diuretics following ESWL for both men and women, it increases the risk of lithotripsy, but the risk of lithotripsy in males (1.6 times) is more than females (1.3 times).Although by examining of lithotripsy percent for both male and female, it was concluded that use of diuretic following EWSL method is very effective and increase lithotripsy up to 1.6 times more likely (about 2-fold), but in this section by Mann-Whitney U Test we want to evaluate the fact that considering subject gender, whether using diuretic following ESWL are useful or not.

Sex	Frequency of removal		Chance of removal (%)	
	Extra Corporeal Shock Wave Lithotripsy without Diuretic	Extra Corporeal Shock Wave Lithotripsy with Diuretic	Extra Corporeal Shock Wave Lithotripsy without Diuretic	Extra Corporeal Shock Wave Lithotripsy with Diuretic
	Men	18	19	42
Women	10	25	59	78

Mann-Whitney U Test

First, a brief description of Mann-Whitney U Test will be presented, and then the test results will be reported. The Mann-Whitney U Test is a comparative test for comparing the condition of two independent groups, and by ordinal data it is better to use a non parametrical test with two independent t tests. Therefore two independent t tests are not used because variable average with ordinal scale does not show real average due to unequal distance. After familiarity with related test, we evaluate the hypothesis in project:

Project hypothesis: diuretic has effect on the removal of small urinary calculus following ESWL.

H0: diuretic has no effect on the removal of small urinary calculus following ESWL.

H1: has effect on the removal of small urinary calculus following ESWL.

Considering the hypothesis of the project, the output of SPSS software version 19 is as follows:

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Parameter	Use /Non-use of Diuretic inside of EWSL	Number of samples	Mean Rank	Sum of Ranks
Removal	Use	60	90.50	5430
	Non-Use	60	30.50	1830

Parameter	Value
Mann-Whitney U Coefficient	2491
Wilcoxon Coefficient	1830
Z	9.682
Sig.	0.000

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Results of Table 1 shows that use of diuretics following EWSL (90.50) compared with non-use of diuretics following EWSL (30.50) will have more impact on the parameters of lithotripsy.

in the second table, amount of Z (9.682) is significant in the level of error smaller than 0.05, we can say with certainty that 0.95, in lithotripsy in people who use diuretics following EWSL Compared with people who do not use, is significant. This result indicates the confirmation of impact of the hypothesis H1 based on diuretics effectiveness on small urinary calculus following ESWL and therefore the project's hypothesis is accepted.

Conclusion

the project descriptive results showed that 49 through 120 subject of the study were women equal to 40.8% and 71 subject were men equal to 59.2%, and we can say that the occurrence of kidney stone among men are more than women. On the other hand, the results show that the subjects are in the age range 18 to 82 years, and this testifies to the fact that kidney stones are common in all age groups. But the average age is 42 years, which is consistent with the findings of other researchers, and they unanimously agreed in middle age are more likely to develop kidney stones. The results of inferential statistics by Mann-Whitney U Test show that the possible lithotripsy are more in women and by diuretic following ESWL for both men and women, the lithotripsy are increasing but, the lithotripsy in men is 1.6 times) than females (1.3 times).

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