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The Predictive Value of the Health Outcomes of Laser Ureteral Debridement, In Addition To Finding Statistical Results between the Technique Used and the Results

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Abstract: Background: Today, urinary tract stones are a widespread issue in the world. Depending on regional factors, gender, and age, the total lifetime chance of developing a urinary tract stone range from 5 to 15%. There is a 5-9% lifetime risk in Europe. **Objective**: This paper aims to assess the predictive value of the health outcomes of laser ureteral debridement, in addition to finding statistical results between the technique used and the results. **Patients and methods**: This paper was reinforced by an analysis of the predictive value of the health outcomes of laser ureteral debridement, in addition to finding statistical results between the technique used and the results which conduct on patients have ages in range (20-65) years where conduct between 16th July 2021 to 24th September 2022 in different hospitals in Iraq. This paper was divided into two groups, males and females even, to study the impact of laser ureteral debridement and to assess the complications after and before operatives of laser ureteral debridement on both of females and males which include 40 cases. The data development was examinations and analysis of all demographic characteristics by the SPSS program. **Results and discussion**: This study's 2:1 male-to-female ratio is consistent with prior studies. The excellent follow-up rate (98%) shows patients were well-informed about the procedure and postoperative NECT. The total SFR was higher than predicted (88%); this is also consistent with results from another research. Additionally, proximal ureteral stones are more likely than distal ureteral stones to dislocate into the renal pelvis, which raises the difficulty level of stone removal and consequently affects the outcomes of the operation. Since these consequences have the potential to be lethal, more research on the subject would be extremely helpful for the patients. Due to the retroactive nature of this study, several limitations exist since the selection bias could not be eliminated. **Conclusion:** The most frequent postoperative complication, including J-coil-related symptoms in 10% (4 patients), was accompanied by ureteral stricture in 10% (4 patients). In 5% of the instances (two patients), emergency treatment was required because of loin discomfort. Following surgery, two patients experienced urinary retention, necessitating open surgical repair. This study found that when employing ULL, considerably greater numbers of patients having renal stones were able to reach stone-free status and had less post-operative problems. The preferred laser for stone lithotripsy is now TFL.

Keywords: ULL surgery; ureteral debridement; Stones locations; J-coil related complication; and Loin pain.

INTRODUCTION

Today, urinary tract stones are a widespread issue in the world. Depending on regional factors, gender, and age, the total lifetime chance of developing a urinary tract stone range from 5 to 15%. There is a 5-9% lifetime risk in Europe [Stamatelou, K.K. *et al*., 2003]. To remove the stone, many individuals must have surgery. Within the following 20 years, there is a large possibility of a stone forming again. [Bartoletti, R. *et al*., 2007; Tiselius, H. *et al*., 2000]

The minerals in urine that crystallize and then develop to create kidney stones are the cause of kidney stones [Coe, F.L. *et al*., 1992]. In developed nations, calcium salts, most frequently calcium oxalate or calcium phosphate, make up many kidney stones. Other forms of stones include those made of cysteine, uric acid, or magnesium ammonium phosphate, such as struvite stones, which are formed of the latter two [Daudon, M. *et al*., 1995; Robbins and Cotran's, 2015]. Urine frequently carries kidney stones when they exit the kidney. Renal colic can be brought on by a stone that is traveling through the urine and becoming lodged in the ureter. [Eisner, B.H. *et al*., 2009]

Based on the ureter's location in relation to the cervical vertebrae on radiographs, the ureter was anatomically split into three parts [Preminger, G.M. *et al*., 2007]. The proximal, middle, and distal ureters are the three segments that are utilized to identify where the stone is located. The ureteropelvic junction (UPJ) and the upper portion of the sacroiliac joint are the two ends of the proximal ureter. The portion of the ureter that is in the direction of the sacroiliac joint is known as the middle ureter [Pak, C.Y, 1991]. The distal ureter connects the bladder and ureter to form the ureterovesical junction (UVJ), that is located at the lower portion of the sacroiliac joint. [Basavaraj, D.R. *et al*., 2007]

The development of stones in the urinary system can be attributed to a variety of disorders and illnesses [Coe, F.L. *et al*., 2005]. The

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supersaturation within the urine appears to be a crucial factor usually, nevertheless. When a substance's concentration exceeds its solubility, a condition known as supersaturation occurs, which causes crystals to form; in addition to supersaturation, several other variables, including low urine pH [Matlaga, B.R. *et al*., 2007; Ordon, M. *et al*., 2013; Clark, A.J. *et al*., 1998], small urinary amounts, calcium, and salt, can contribute to the development of stones. Other elements like citrate and magnesium prevent crystallization and agglomeration, hence preventing the production of stones [Monga, M, 2013]. Therefore, whether a stone form depends on the balance between promoting and inhibiting factors rather than just the quantity of minerals in the urine [Leijte, J.A. *et al*., 2008], this paper aims to assess the predictive value of the health outcomes of laser ureteral debridement, in addition to finding statistical results between the technique used and the results.

PATIENTS AND METHODS

This paper was reinforced by an analysis of the predictive value of the health outcomes of laser ureteral debridement, in addition to finding statistical results between the technique used and the results which conduct on patients have ages in range (20-65) years where conduct between 16th July 2021 to 24th September 2022 in different hospitals in Iraq. This paper was divided into two groups, males and females even, to study the impact of laser ureteral debridement and to assess the complications after and before operatives of laser ureteral debridement on both of females and males which include 40 cases. The data development was examinations and analysis of all demographic characteristics by the SPSS program.

To build up of methodology laser study, this paper was analysis all demographic characteristics examinations based on age, sex into males and females, stone location, which include Lower calyx, Mid calyx, pelvis, Proximal ureter, and Upper calyx, as well as, number of kidney stones that have to number of kidney stones of Double, and Single where all baseline of demographic characteristics can be defined in Table 1, Table 2, Table 3, and Table 4.

To follow that, this paper was extended to examine the distribution of laser ureteral debridement patients according to stone size, which is divided in two parameters which are < 5 mm and > =5 mm, where these outcomes parameters can be clarified in Table 5.

Furthermore, this study was focused into the distribution of preoperative urine culture into laser ureteral debridement patients for both males and females, where it depended on two sides which represented into positive and negative, where all results can be shown in Figure 1.

To further of outcomes, this paper was estimated of comorbidity for laser ureteral debridement patients to accuse into males and females into three basic parameters, which are Diabetes mellitus, Heart disease, and High blood pressure. Where these outcomes are found in Table 6; moreover, this study was extended to estimate of abnormalities for laser ureteral debridement patients to accuse into males and females, which include AV malformation, Malrotation, none, and Renal ectopia, where all these information have found into Table 7.

Besides to that, this study was examined of changes of preoperative decompression into laser ureteral debridement patients in evaluations of patients by yes and no, which these results have been found in Figure 2. Furthermore, this paper was examined of changes of post-operative decompression into laser ureteral debridement patients as well as into patients' assessment by yes and nowhere. The details can be seen in Figure 3.

To progress of results evaluations, this paper was extended to determine operation time used during laser ureteral debridement surgery patients for both males and females into both sides, which are < 60 and > 60 where these results have cleared in Table 8.

To assess of results, this study was assessed the post-operative rate of postoperative febrile UTI after ULL surgery in comparison between Negative urine culture and Positive urine culture were determined into Negative urine culture and Positive urine culture all these outcomes have found in Figure 4.

To the complications side, our study was evaluated by assessment of preoperative complications during using ULL surgery for laser ureteral debridement patients though using Bleeding, Mucosal injury, None, Small caliber ureter, and Submucosal guidewire placement. These results have noticed in Table 9.

In contract, this study was conducting to assess of post-operative complications during using ULL surgery for laser ureteral debridement patients into determine with these parameters which are Febrile

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urinary tract infection, J-coil related complication, Loin pain, None, Ureteral stricture, and Urinary retention where these results have estimated and analysed in Table 10.

RESULTS

Table 1: Baselines of demographic laser ureteral debridement patients based on ages

Age		
N	Va	40
	Mi	0
M		43.7750
SEOM		1.81429
Mo		25.00[a]
SD		11.47458
Var		131.666
Sk		.083
SEOS		.374
Ra		40.00
Min		25.00
Max		65.00
S		1751.00

Table 2: Baselines of demographic laser ureteral debridement patients based on sex

		F	P (%)	VP (%)	CP (%)
Val	Female	14	35.0	35.0	35.0
	Male	26	65.0	65.0	100.0
	T	40	100.0	100.0	

Table 3: Baselines of demographic laser ureteral debridement patients based on stone location

		F	P (%)	VP (%)	CP (%)
Val	Lower calyx	4	10.0	10.0	10.0
	Mid calyx	5	12.5	12.5	22.5
	pelvis	15	37.5	37.5	60.0
	Proximal ureter	6	15.0	15.0	75.0
	Upper calyx	10	25.0	25.0	100.0
	T	40	100.0	100.0	

Table 4: Baselines of demographic laser ureteral debridement patients based on the number of kidney stones

		F	P (%)	VP (%)	CP (%)
Val	Double	7	17.5	17.5	17.5
	Single	33	82.5	82.5	100.0
	T	40	100.0	100.0	

Table 5: Distribution of laser ureteral debridement patients according to stone size

		F	P (%)	VP (%)	CP (%)
Val	< 5 mm	16	40.0	40.0	40.0
	> =5 mm	24	60.0	60.0	100.0
	T	40	100.0	100.0	

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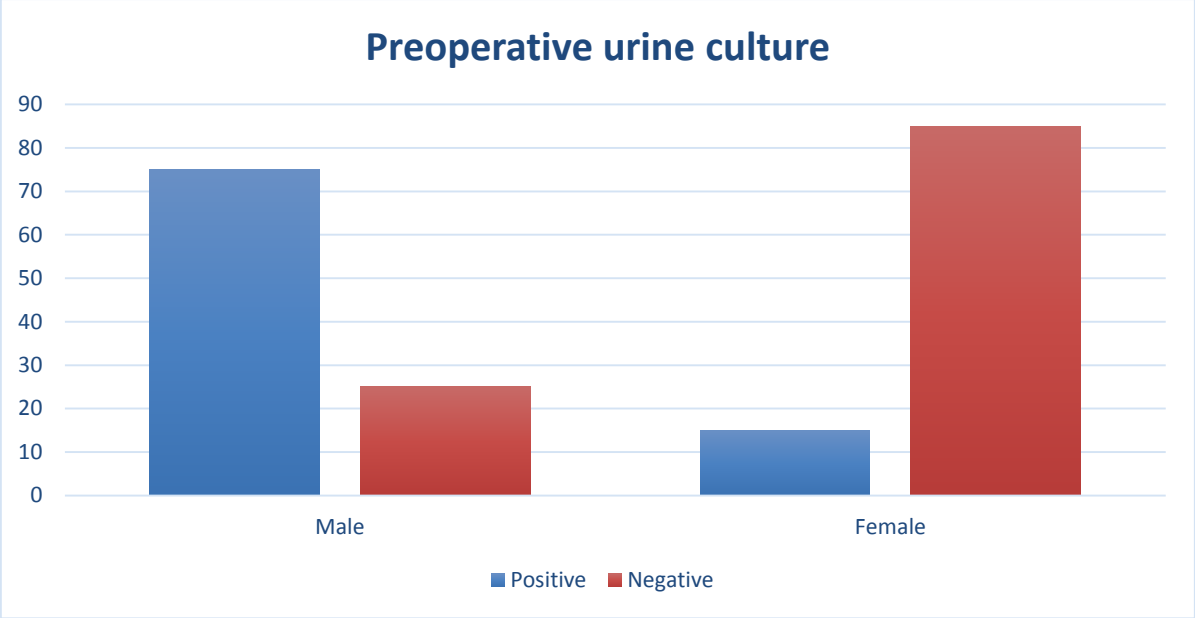

Figure 1: Distribution of preoperative urine culture into laser ureteral debridement patients.

Table 6: Estimations of Comorbidity for laser ureteral debridement patients to accuse into males and females

		F	P (%)	VP (%)	CP (%)
Val	Diabetes mellitus	18	45.0	45.0	45.0
	Heart disease	9	22.5	22.5	67.5
	High blood pressure	13	32.5	32.5	100.0
	T	40	100.0	100.0	

Table 7: Estimations of Abnormalities for laser ureteral debridement patients to accuse into males and females

		F	P (%)	VP (%)	CP (%)
Val	AV malformation	3	7.5	7.5	7.5
	Malrotation	2	5.0	5.0	12.5
	none	31	77.5	77.5	90.0
	Renal ectopia	4	10.0	10.0	100.0
	T	40	100.0	100.0	

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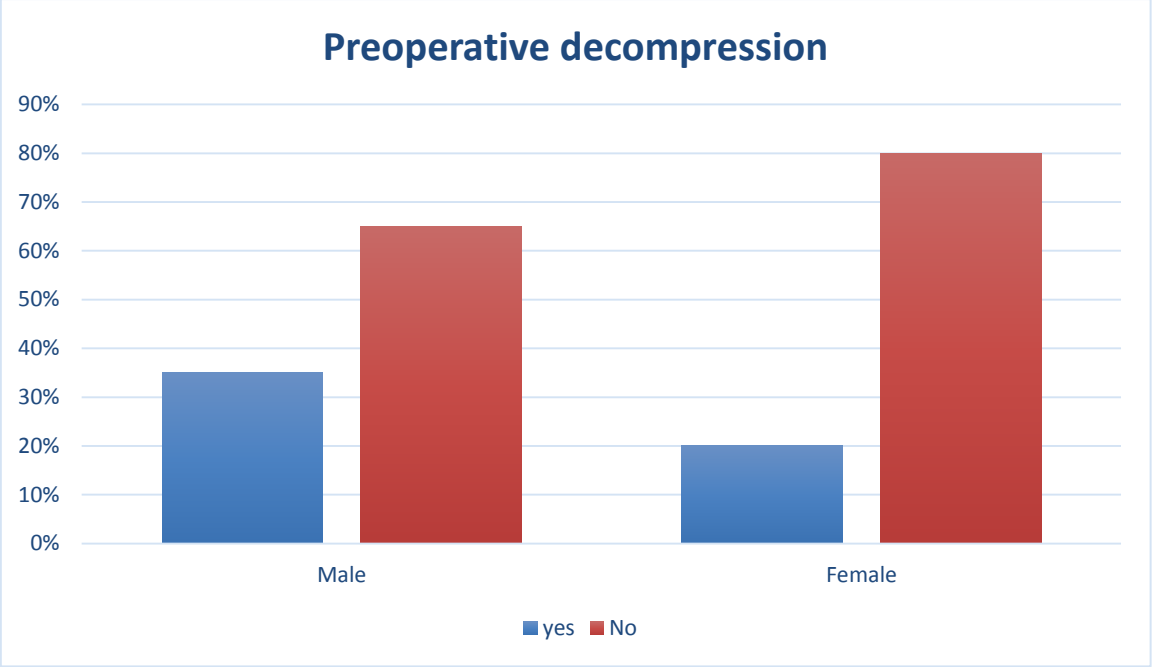

Figure 2: Examinations of changes of preoperative decompression into laser ureteral debridement patients

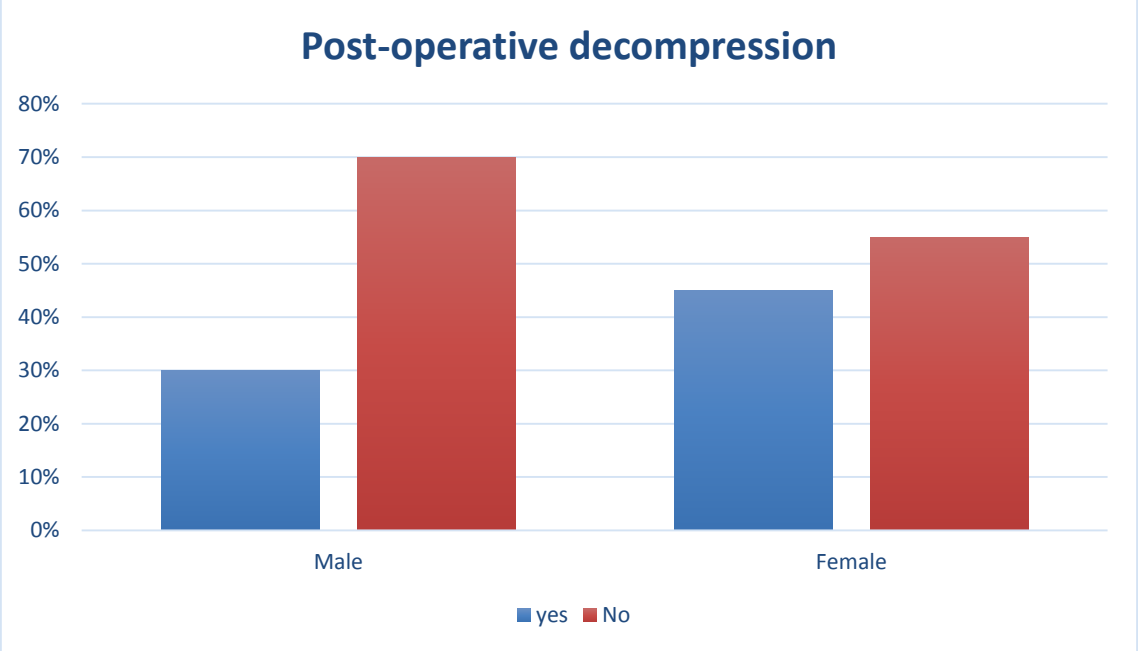

Figure 3: Examinations of changes of post-operative decompression into laser ureteral debridement patients

Table 8: Determination of operation time used during laser ureteral debridement surgery patients for both males and females

		F	P (%)	VP (%)	CP (%)
Val	< 60	15	37.5	37.5	37.5
	> 60	25	62.5	62.5	100.0
	T	40	100.0	100.0	

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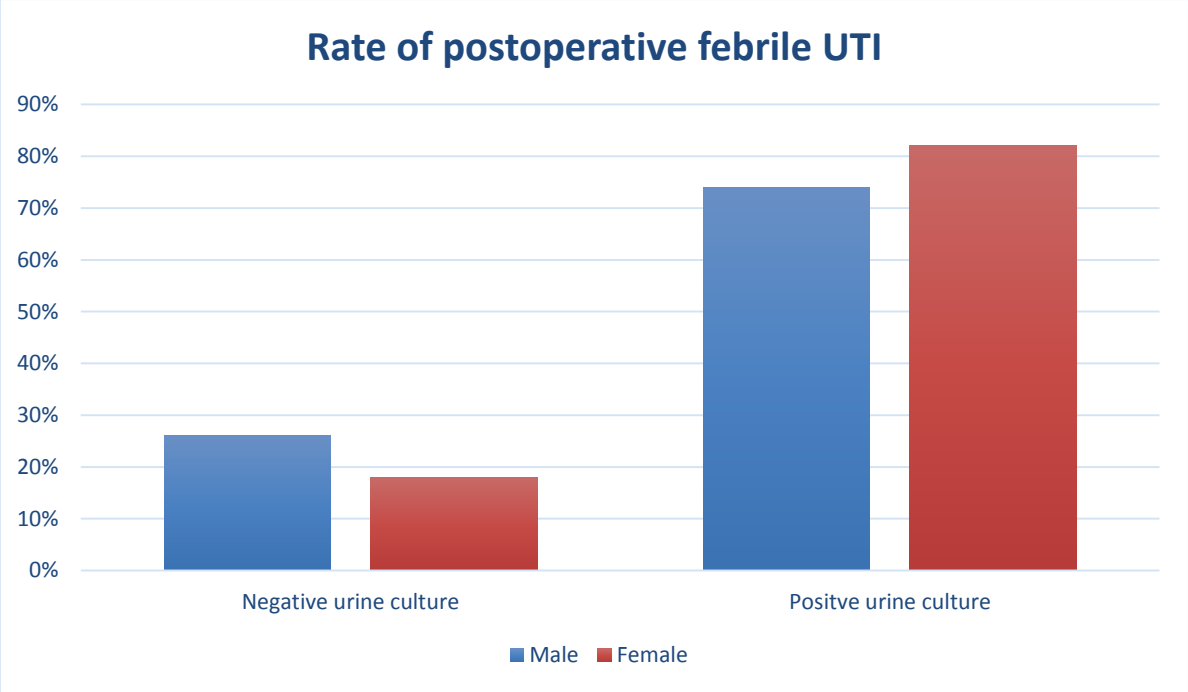

Figure 4: Assessment of postoperative rate of postoperative febrile UTI after ULL surgery in comparison between Negative urine culture and Positive urine culture

Table 9: Assessment of preoperative complications during using ULL surgery for laser ureteral debridement patients

		F	P (%)	VP (%)	CP (%)
Val	Bleeding	7	17.5	17.5	17.5
	Mucosal injury	10	25.0	25.0	42.5
	None	17	42.5	42.5	85.0
	Small caliber ureter	1	2.5	2.5	87.5
	Submucosal guidewire placement	5	12.5	12.5	100.0
	T	40	100.0	100.0	

Table 10: Assessment of post-operative complications during using ULL surgery for laser ureteral debridement patients

		Frequency	Percent	Valid Percent	Cumulative Percent
Val	Febrile urinary tract infection	2	5.0	5.0	5.0
	J-coil related complication	4	10.0	10.0	15.0
	Loin pain	2	5.0	5.0	20.0
	None	26	65.0	65.0	85.0
	Ureteral stricture	4	10.0	10.0	95.0
	Urinary retention	2	5.0	5.0	100.0
	T	40	100.0	100.0	

DISCUSSION

This study's 2:1 male-to-female ratio is consistent with prior studies. The excellent follow-up rate (98%) shows patients were well-informed about the procedure and postoperative NECT. The total SFR was higher than predicted (88%); this is also consistent with results from another research. SFR differences between proximal and distal stones were found, accounting for 85, respectively, which is consistent with other studies looking at the same topic. This observation could be explained by the fact that distant stones are simpler to reach. The SFR may be impacted by the fact that the median stone size appeared larger in the proximal ureter compared to the distal ureter. [Sofer, M. *et al.*, 2002]

Additionally, proximal ureteral stones are more likely than distal ureteral stones to dislocate into the renal pelvis, which raises the difficulty level of stone removal and consequently affects the outcomes of the operation. In addition to having a

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lower SFR than distal stones, proximal stones also required more time during surgery. The median operating time they were varied among proximal versus distal stones by 60 minutes. Mid-ureteral stones, as well as proximal ureteral stones, took around 60 minutes longer to remove, on average, during surgery. Stones that are closer to the operator are more difficult to remove than stones that are farther away, according to longer operating periods and lower SFR.

Our study found that the most frequent postoperative complication that wasn't related to stents was febrile UTI. Patients experienced a postoperative febrile UTI in 13% of the cases, which is a higher rate than in earlier research. The French study [Vassar, G.J. *et al*., 1999] shown the concept of postoperative febrile UTI, particularly varies among papers, may have an impact on this. The fact that males experience postoperative febrile UTIs more frequently than females does is intriguing, especially for those who had a positive preoperative culture of their urine. It is widely known that women are more likely than males to have UTIs in the general population because of their shorter urethra, which makes it easier for bacteria to colonize. This finding may also account for the increased incidence of postoperative febrile UTI in women.

Additionally, struvite stones, or infectious stones, which develop when urease-producing bacteria invade the urinary tracts, are more common in men. This may be a factor in this group's higher likelihood of postoperative febrile UTI. However, neither the stone's composition nor other potential risk factors for males were examined in this paper and need more research. American study presented that a greater likelihood for postoperative febrile UTI was likewise linked to positive preoperative urine cultures alone.

Despite routinely administered paroral antibiotics, including a single dose of intravenous Gentamicin throughout the preoperative period. This patient group varies from individuals who had a negative preoperative urine culture [Harmon, W.J. *et al*., 1997], which might be one explanation for the situation. They could suffer from many diseases or have compromised immune systems, making them more susceptible to virulent bacterial colonization. However, this was not examined in the study. Another possibility is that this group's preoperative antibiotic therapy was too brief. This is a significant issue that needs more research. [Iqbal, M.W. *et al*., 2016]

Since these consequences have the potential to be lethal, more research on the subject would be extremely helpful for the patients. Due to the retroactive nature of this study, several limitations exist since the selection bias could not be eliminated. Additionally, there were probably some factors impacting the outcomes that were not studied [Türk, C. *et al*., 2016], and the comparison groups were not identical. More randomized research is required to address these issues.

CONCLUSION

The most frequent postoperative complication, including J-coil-related symptoms in 10% (4 patients), was accompanied by ureteral stricture in 10% (4 patients). In 5% of the instances (two patients), emergency treatment was required because of loin discomfort. Following surgery, two patients experienced urinary retention, necessitating open surgical repair. This study found that when employing ULL, considerably greater numbers of patients having renal stones were able to reach stone-free status and had less post-operative problems. The preferred laser for stone lithotripsy is now TFL.

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