

## PERCUTANEOUS NEPHROSTOMY AND DOUBLE PIGTAIL (JJ) URETERAL STENTS AS TEMPORARY METHODS IN SOLVING SUPRAVESICAL OBSTRUCTION CAUSED BY STONE

Ljubomir Dinić<sup>1</sup>, Jablan Stanković<sup>1,2</sup>, Milan Potić<sup>1</sup>, Aleksandar Skakić<sup>1</sup>,  
Marija Mihajlović-Tošić<sup>1</sup>, Vladimir Milić<sup>3</sup>, Natalija Vuković<sup>3</sup>,  
Jelena Kostić<sup>4</sup>, Nataša Đinđić<sup>2</sup>

Percutaneous nephrostomy and ureteral stenting are temporary treatments for the upper urinary tract obstruction.

The aim of this study was to evaluate the efficacy of these two methods by comparing complications, placement success, urinary symptoms, urine culture analyses prior to derivation placement and derivation removal and success of stone elimination after extracorporeal shock wave lithotripsy (ESWL).

This prospective study included 157 patients with supravescical obstruction caused by ureteral stones. Eighty-one patients underwent percutaneous nephrostomy, and JJ stent was inserted in seventy-six (76) patients. After resolving the obstruction, ESWL was performed in all patients.

There were no statistically significant differences in success of the urinary derivation placement, the urine culture results before and after placement and success of ESWL treatment between the two studied groups ( $p > 0.05$ ). Urinary symptoms (dysuria, hematuria, urinary urgency, frequent urination during the day) were significantly more present in patients with a JJ stent and this difference was statistically significant for each symptom ( $p < 0.001$ ). Major complications were verified in 2 (2.46%) patients with PCN catheter, and in 7 (9.2%) patients in the group with the JJ stent. Minor complications were significantly more frequent in the group with the JJ stent compared to the group with PCN catheter (28.39% vs 60.52%,  $p < 0.001$ ).

Percutaneous nephrostomy and JJ stenting are optimal methods for temporary treatment of supravescical obstruction caused by ureteral stones, with similar incidence of the following complications, except for the pain, which dominates in patients with the JJ stent. Urinary symptoms and asymptomatic bacteriuria are more common in patients with the JJ stent. If the ESWL treatment of ureteral stone is performed after urinary derivation placement, we can expect greater success in patients with the JJ stent. *Acta Medica Medianae* 2015;54(3):39-44.

**Key words:** percutaneous nephrostomy, double pigtail (JJ) ureteral stent, ESWL

Clinic of Urology, Clinical Center Niš, Niš, Serbia<sup>1</sup>  
University of Niš, Faculty of Medicine, Niš, Serbia<sup>2</sup>,  
Center for Anesthesiology and Reanimation, Clinical Center Niš,  
Niš, Serbia<sup>3</sup>  
Institute for nephrology and haemodialysis, Clinical Center Niš,  
Niš, Serbia<sup>4</sup>

Contact: Ljubomir Dinić  
Clinic of Urology, Clinical Center Niš, Serbia,  
Bul. Zorana Đinđića 48, Niš  
E mail: ljubomidinic@gmail.com

### Background

The most common cause of acute supravescical obstruction or obstruction of the upper urinary tract is stone. In cases where an obstruction is associated with persistent pain that does not respond to therapy, high temperature or sep-

sis and reduced renal function, it requires urgent intervention (1, 2). It involves drainage of urine which is performed by placement of percutaneous nephrostomy (PCN) catheter or ureteral (JJ) stent with or without repositioning of stone, before making a definitive diagnosis and treatment of obstruction (3, 4). The choice of the method may vary depending on factors such as the etiology of the obstruction, tendency of physician to a certain method, experience and equipment of the institution. Although both methods are used to resolve the obstruction, opinions that one of them is more effective than the other are controversial (5). The aim of our study was to evaluate the efficacy of these two methods by analyzing and comparing: complications during and after the placement of PCN catheter and JJ stent, placement success, regression of hydronephrotic changes after placement, urinary symptoms, urine culture prior to

placement and before removal of the derivation and success in stone elimination after extracorporeal shockwave lithotripsy (ESWL).

### Material and methods

A comparative prospective study included 157 patients with ureteral stone, who were treated at Urology Department, Clinical Center Niš, in the period between 2006 and 2013. Besides the presence of ureteral stone, other criteria of this study were: third-degree hydronephrosis on the side of the stone, or obstruction followed by fever (38°C or more) or pain that does not respond to analgesics. For the diagnosis of stone and hydronephrosis or obstruction, the following diagnostic methods were used: plain film of the urinary tract, intravenous urography or ultrasonography. Eighty-one patients underwent ultrasound-guided percutaneous nephrostomy in sedoanalgesia or local anesthesia, with a final fixation of PCN catheter to the skin. The size of catheter was 8-9 F. After PCN catheter placement, plain abdominal film of the urinary tract was made in order to check the position of the catheter. In 76 patients, the JJ stent sized 7-8 was placed using a rigid cystoscope under local anesthesia. The choice of derivation depended on practical experience and preferences of urologist for one of these two methods. All patients received antibiotic prophylaxis or antibiotic therapy according to urine culture results if urinary tract infection was present. After resolving the obstruction, ESWL was performed in all patients. The following parameters were analyzed: success of the derivation placement, regression of hydronephrotic changes after placement, complications during and after the placement of PCN catheter or JJ stent, presence of urinary symptoms while carrying the derivation, and stone elimination after ESWL. Placement was defined as successful (without additional intervention) or unsuccessful (PCN catheter placement under radiology control or PCN catheter placement in patients with failed JJ stent placement). Regression of hydronephrotic changes was monitored for 24 hours after placement and evaluated as complete (complete regression) or incomplete (incomplete or unchanged condition). All major and minor complications were verified during placement and carrying the derivation. Urinary symptoms were analyzed using a questionnaire containing four questions about the presence of dysuria, hematuria, urinary urgency and frequency of urination. Symptoms were rated as moderate (occasionally present or absent), and more moderate (often or always present), and the frequency of urination was rated as moderate ( $\leq 8$  times per day) and more moderate ( $> 8$  times per day). The status of bacteriuria was evaluated according to the results of the urine culture analyses before placement and removal of PCN catheter or JJ stent. The precondition for taking urine culture before derivation removal was that the patients were not on antibiotic therapy at least five days. The success of

ESWL treatment was based on the elimination of stone fragments and evaluated as successful (complete elimination after three months) or unsuccessful (incomplete or absent elimination after three months). T test and nonparametric tests were used for statistical analysis.

### Results

In patients in PCN group there were 25 (30.86%) males and 56 (69.14%) females, mean age  $52.5 \pm 14.29$  years, and in the group with a JJ stent there were 34 (44.73%) male and 42 (55.27%) female patients with mean age  $51.15 \pm 10.8$  years. There were no statistically significant differences in age ( $p=0.729$ ) and gender ( $p=0.33$ ) between these two groups. PCN catheter was successfully placed in all 81 patients, and JJ stent in 76/80 (95%) patients (four patients were transferred to the PCN group due to failure of the JJ stent placement). Reposition of ureteral stone with the JJ stent was detected in fifteen patients, but before performing ESWL all stones migrated back to the ureter. In 57 patients in PCN group, stone was located in the left ureter, and in 24 patients in the right ureter. In 53 patients from the JJ stent group, stone was located in the left ureter, and in 23 patients in the right ureter. There was no statistically significant difference in the size of the stones between two groups (Table 1). After derivation placement, complete regression of hydronephrotic changes was noted in both groups within 24 hours. The average length of carrying PCN catheter was  $71.7 \pm 47.57$  days, and JJ stent  $48.30 \pm 26.76$  days.

**Table 1.** Localization and size of stones in patients with PCN catheter and JJ stent

Localization of stone	PCN group	JJ group	Statistic significance
Left ureter	57	53	
Right ureter	24	23	$p=0.93$
Stone size	$9.0 \pm 1.42$	$8.60 \pm 1.42$	$p=0.01$

The difference in the length of carrying PCN catheter and JJ stent was not statistically significant between two groups ( $p=0.072$ ). Forty-two (51.85%) patients had sterile urine culture before placing PCN catheter and 50 (65.78%) patients before placing the JJ stent. Thirty (37%) patients had sterile urine culture before PCN catheter removal, whereas 30 (39.47%) patients had sterile urine culture before removing the JJ stent. There were no statistically significant differences between the groups with regard to the sterility of the urine before and after derivation placement (Table 2). By comparing urine culture results within the group, before placement and before removal of the derivations, we recorded a statistically significant increase in positive urine culture results in patients with the JJ stent ( $p=0.002$ ). The analysis of urinary symptoms (dysuria, hematuria, urinary urgency, and frequency of urination), shown in

**Table 2.** Urine culture results before placing and before removing the derivation

Before placement	PCN group	JJ group	p value
Sterile	42	50	
Non-sterile	39	26	p=0,41
Before removal			
Sterile	30	30	
Non-sterile	51	56	p=0.88

**Table 3.** Urinary symptoms in patients with PCN catheter and JJ stent

Urinary symptoms	Moderate	More moderate
Hematuria		
PCN	76	5
JJ stent	53	23*
Disuria		
PCN	74	7
JJ stent	49	27*
Urinary urgency		
PCN	76	5
JJ stent	49	27*
Frequency of urination	≤ 8 times	> 8 times
PCN	78	3
JJ stent	50	26*

\*- p<0,001

Table 3, were more common in patients with the JJ stent as compared to a PCN group, and this difference was statistically significant for each of the symptoms.

Major complications were reported in two patients (2.46%) with PCN catheter: hemorrhage that required transfusion in one patient and septic response after the placement of PCN catheter in other patient. Minor complications were reported in 23 patients (28.39%). In ten patients (12.34%), there was a disposition (dislocation) of PCN catheter, therefore, its repositioning and replacement was made through the existing nephrostomy canal. Six patients had a short episode of fever (temperature  $\geq 38^{\circ}\text{C}$ ). Skin inflammation at the site of PCN catheter was reported in nine patients, and occlusion of the catheter in remaining four patients.

In the group with the JJ stent, major complications were found in seven patients (9.21%), as follows: septic reaction was reported in one patient (1.31%), hematuria in two patients after derivation placement (2.63%), migration for which repositioning of the JJ stent was made was observed in two patients (2.63%) and incrustation after 90 days of derivation placement was found in two patients (2.63%), whereas the JJ stent was removed without further complications.

Minor complications were found in 46 patients (60.52%), as follows: in 26 (34.21%) patients occasional pain in the bladder while carrying a stent was reported, twelve (15.78%) of them had a brief episode of fever and chills, in twenty (26.31%) patients flank pain on the side of the stent was found, whereas nine (11.84%) of them

had occasional pain in the thigh during urination. The analysis of minor complications between the two groups showed statistically significant difference in favor of the JJ stent group (Table 4).

**Table 4.** The presence of major and minor complications in patients with PCN catheter and JJ stent

Complications	PCN group	JJ group	p value
Major	2.46 %	9.21 %	p=0.38
Minor	28.39 %	60.52%	p<0.001

In most cases (141/157, 89.80%), treatment was carried out with one or two ESWL sessions, and in the other patients (16/157, 10.20%) three or more sessions of ESWL were done. In PCN group the average number of sessions was 2.2 and 2.0 in the JJ stent group. There were no statistically significant differences in the number of ESWL sessions between these two groups as shown in Table 5.

**Table 5.** The number of ESWL sessions and stone elimination in patients with PCN catheter and JJ stent

Number of ESWL sessions	PCN group	JJ group	p value
≤ 2	69	72	
≥ 3	12	4	p=0.08
Stone elimination			
Complete	69	70	
Incomplete or absent	12	6	p=0.26

The number of ESWL sessions was higher in patients with larger stones. Three months after the last session, the number of patients not having stones was 69/81 (85.18%) in PCN group, and 70/76 (92.10%) in the JJ stent group (Table 5). Ten patients from PCN group and six patients from the JJ stent group underwent ureterolithotripsy because of absence of elimination and optimal disintegration of the stone.

## Discussion

Two main goals in the treatment of obstruction caused by a stone are resolving the obstruction, treatment of sepsis (if present) and breaking or removing of the stone (4). Temporary resolution for obstruction of the upper urinary tract is achieved by placing the PCN catheter and JJ stent. Which of these methods is more effective in resolving the obstruction remains a matter of discussion.

The 100% success of the PCN catheter placement in our study is comparable to the 90%-100% success of that has been shown in other studies (6-8) and is probably the result of many years of experience in the implementation of this method in our department. Retrograde JJ stent placement was unsuccessful in four patients (5%) due to stones sized 10-12 mm. Depending on the etiology of the ureteral obstruction, successful pla-

cement of the JJ stent varies from 94% among benign, "intrinsic" to the 21-73% of malignant, "extrinsic" obstruction (9, 10). In stone obstruction, failure of JJ stent placement is much more common in larger stones and ranges up to 25%, so our result is comparable with others.

While carrying the derivation, no clinically evident and symptomatic urinary infection was noted. Many studies have analyzed the relation between bacteriuria and stent colonization and came to the conclusion that regardless of the urine culture, stent colonization percentage ranges up to 100% (11) depending on the length of carrying the derivation. Although colonization of the stent was not an area of our study, a significant increase in positive urine culture in the group with JJ stent can be explained as the consequence of colonization, which is a good source for the development of bacteriuria and infection caused by the stent.

Analysis of the four urinary symptoms questionnaire (hematuria, dysuria, urgency and urinary frequency) indicates a high occurrence of irritative urinary symptoms in patients with the JJ stent. These symptoms are mainly caused by bladder irritation with a distal end of the JJ stent which may cause erosion of the bladder mucosa. They can lead to intolerance which requires premature removal of the stent (12). Our results are consistent with similar observations of other authors who report the presence of urinary symptoms up to 90% (3, 12-14).

Complications developed during and after derivation placement were monitored until the moment of their removal. The development of clinically evident sepsis in one patient (1.23%) in the PCN group is probably caused by the penetration of infected urine into the systemic circulation. It is well-known that any obstruction is potentially infectious and that the percutaneous manipulation of the catheter and the guide wire can cause a rise in pressure in the hollow system of the kidneys, and thereby cause the penetration of bacteria into the circulation (15). Several studies have shown that the incidence of post-procedural septicemia is ranging up to 4% of cases (2, 6, 7, 15). Bleeding that required transfusion in one patient (1.23%) in PCN group was caused by the placement of PCN through the infundibulum of calyx, and this case was also reported by other authors (6). Much more common causes of bleeding is dilatator break-through or puncture needles enveloped in a larger blood vessel. Significant bleeding as a complication has been observed in 1 to 4.3% of cases in other studies, which makes our result comparable (6-8, 15).

Minor complications were observed in 28.39% of cases in our series, and they were in correlation with the results published by other authors (7). Besides PCN catheter dislocation, occlusion, short episodes of fever and local inflammation of the skin, they recorded other minor complications in the range from 5% to 38% cases, such as: extravasation of urine (caused by perforation of

pyelon), pleural effusion, pneumonia, urinary leakage at the site of PCN catheter and urinary tract infections (6-8). In our study, the dislocation was the most common complication (12.34%) and this result correlates with the results of other studies (8). Although some authors find dislocation associated with the type of catheter, obesity, movement of patients or poor fixation (16), we think that the main cause of this complication in our patients is loosening of stitches due to long-term carrying of the PCN catheter and inadequate handling with drainage system during the day and overnight.

In the group with the JJ stent, major complications were observed in 9.21% of patients, while other authors record their occurrence in 32.7% of patients, and they include ureteral perforation, occlusion and fragmented JJ stent as well as the newly hydronephrosis accompanied by urinary infection and pain in the lumbar region (17). Septic response in one patient in the group with the JJ stent is probably due to instrumentation with existing urinary tract infection. Migration is a well-known phenomenon whose incidence is increasing with use of silicon, and decreasing with the use of polyurethane stents. Although in our study only polyurethane stents were used, migration was observed in two (2.63%) patients, whereas in other studies it range from 0.1% to 8.2% (17, 18).

Stent encrustation noted in two patients (2.63%), after three months of placement, was the result of deposition of crystalline urine components to the outer and the inner surface of the stent, and is one of the main reasons for its dysfunction. El Faqih et al. studied the occurrence of encrustations while carrying the stent placed for the treatment of stones in the urinary tract and came to the following results: in 9.2% of patients, encrustation emerged within six weeks after placement, in 47.5% in six to twelve weeks after placement, and in 76.3% in more than twelve weeks (19). These results show that the encrustation is in the function of time. If stent stays too long in the ureter, except massive encrustations, stent fracture can occur, and its removal may become complicated and difficult. To prevent the aforementioned complications, many authors recommend carrying a stent up to three months, or its replacement when long-term carrying is indicated (15). After the ESWL treatment of ureteral stones in the above-mentioned patients was completed, we safely removed the stent nine days after the placement.

The results related to the minor complications in our JJ stent group were correlated with the results published by other authors (12). If minor complications are carefully analyzed in the group with the JJ stent, we can notice that pain dominates in this category (60.52%), regardless of location, and a similar result was presented by Joshi in 2002 with the analysis of the symptoms associated with ureteral stents and their impact on the quality of life (20). The occurrence of pain in the

kidney area during urination is a symptom characteristic the stent, which may indicate the presence of vesicoureteral reflux.

ESWL is the method of choice for the treatment of ureteral stone with a high degree of success and the relatively low levels of morbidity and mortality (21), without use of general or regional anesthesia (22). The majority of ureteral stones is now successfully treated "in situ" without additional procedures, even in the presence of obstruction caused by stones (22, 23). In complicated cases, better results can be obtained with the combination of ESWL and minimal invasive procedures such as the ureteral stent or PCN placement. Although there were no statistically significant differences in the success of ESWL treatment of ureteral stones (complete elimination of fragments of stones three months after the last session), greater success was achieved in patients with the JJ stent (92.10%) in relation to the PCN group (85.18%). In the available literature there is only one article published on a similar topic, in which the author compared the success of ESWL treatment of ureteral stones in patients with PCN, JJ stent and urgent in situ ESWL in patients with obstruction caused by ureteral stone (4). Those results showed greater success of ESWL in patients with JJ stents

(70%) compared to the group with the PCN (54%) as we have confirmed by our results. A poor success of ESWL treatment in patients with PCN might be able to justify the position of the stone within the ureter, which we have not taken into account (ESWL treatment success is greater for stones in the upper than in the middle and lower part of the ureter) as one of the important factors for the success of ESWL, given that other factors (size, composition and type of stone lithotripta) were relatively equal in both groups.

## Conclusion

Percutaneous nephrostomy and JJ stenting are optimal methods for temporary treatment of supravescical obstruction caused by ureteral stones with the placement success of 95% or more. Although the incidence of associated complications was approximately the same for both methods, pain was dominant in patients with the JJ stent (regardless of location). Notwithstanding the absence of symptomatic and clinically evident urinary tract infections, bacteriuria is more common in patients with the JJ stent. If ESWL treatment of ureteral stone is performed after the applied derivation, we can expect greater success in patients with a JJ stent.

## References

1. Mokhmalji H, Braun MP, Martinez Portillo JF, Siegsmund M, Alken P, Kohrmann UK. Percutaneous nephrostomy versus ureteral stents for diversion of hydronephrosis caused by stones: A prospective, randomized clinical trial. *J Urol* 2001; 165: 1088-92. [[CrossRef](#)] [[PubMed](#)]
2. Pearle MS, Pierce HL, Miller G.L, Summa JA, Mutz JM, Petty BA, et al. Optimal method of urgent decompression of the collecting system for obstruction and infection due to ureteral calculi. *J Urol* 1998; 160: 1260-4. [[CrossRef](#)] [[PubMed](#)]
3. Joshi HB, Adams S, Obadeyi OO, Rao PN. Nephrostomy tube or "JJ" ureteric stent in ureteric obstruction: assessment of patient perspectives using quality-of-life survey and utility analysis. *Eur Urol* 2001; 39: 695-701. [[CrossRef](#)] [[PubMed](#)]
4. Joshi HB, Obadeyi O.O, Rao PN. A comparative analysis of nephrostomy, JJ stent and urgent *in situ* extracorporeal shock wave lithotripsy for obstructing ureteric stones. *BJU International* 1999; 84: 264-9. [[CrossRef](#)] [[PubMed](#)]
5. Watson GM. Double-J (JJ) stent versus nephrostomy tube drainage. In: Yashia D, Peter J, editors. *Stenting the Urinary System*, 2<sup>nd</sup> ed. CRC Press 2004; p.149-59. [[CrossRef](#)]
6. Skolarikos A, Alivizatos G, Papatsoris A, Constantinides K, Zervas A, Deliveliotis C. Ultrasound-guided percutaneous nephrostomy performed by urologists: 10-year experience. *Urology* 2006; 68: 495-9. [[CrossRef](#)] [[PubMed](#)]
7. Radecka E, Magnusson A. Complications associated with percutaneous nephrostomies. A retrospective Study. *Acta Radiol* 2004; 45: 184-8. [[CrossRef](#)] [[PubMed](#)]
8. Wah TM, Weston MJ, Irving HC. Percutaneous nephrostomy insertion: outcome data from a prospective multi-operator study at a UK training centre. *Clin Radiol* 2004; 59: 255-61. [[CrossRef](#)] [[PubMed](#)]
9. Yossepowitch O, Lifshitz A, Dekel Y, Gross M, Keidar DM, Neuman M, et al. Predicting the success of retrograde stenting for managing ureteral obstruction. *J Urol* 2001; 166: 1746-9. [[CrossRef](#)] [[PubMed](#)]
10. Chitale SV, Scott-Barret S, Ho ET, Burgess NA. The management of ureteric obstruction secondary to malignant pelvic disease. *Clin Radiol* 2002; 57: 1118-1021. [[CrossRef](#)] [[PubMed](#)]
11. Riedl CR, Plas E, Hubner WA, Zimmerl H, Ulrich W, Pfluger H. Bacterial colonization of ureteral stents. *Eur Urol* 1999; 36: 53-9. [[CrossRef](#)] [[PubMed](#)]
12. Bregg K, Riehle RA, Jr. Morbidity associated with indwelling internal ureteral stents after shock wave lithotripsy. *J Urol* 1989; 141: 510-12. [[PubMed](#)]
13. Pollard SG, MacFarlane R. Symptoms arising from double-J ureteral stents. *J Urol* 1988; 139: 37-8. [[PubMed](#)]
14. Joshi HB, Stainthorpe A, Mac Donald RP, Kelley FX Jr, Timoney AG. Indwelling ureteral stents: evaluation of symptoms, quality of life and utility. *J Urol* 2003; 169: 1065-9. [[CrossRef](#)] [[PubMed](#)]
15. Hausegger KA, Portugaller HR. Percutaneous nephrostomy and antegrade ureteral stenting: technique-indications-complications. *Eur Radiol* 2006; 16: 2016-30. [[CrossRef](#)] [[PubMed](#)]
16. Mahaffey KG, Bolton DM, Stoller ML. Urologist directed percutaneous nephrostomy tube placement. *J Urol* 1994; 152: 1973-6. [[PubMed](#)]

17. Ringel A, Richter S, Shalev M, Nissenkorn I. Late complications of ureteral stents. *Eur Urol* 2000; 38: 41-4. [[CrossRef](#)] [[PubMed](#)]
18. Andriole GL, Bettmann MA, Garnick MB, Richie JR. Indwelling double-J ureteral stents for temporary and permanent urinary drainage: experience with 87 patients. *J Urol* 1984; 131: 239. [[PubMed](#)]
19. El-Faqih SR, Shamsuddin AB, Chakrabarti A, Atassi R, Kardar AH, Osman MK, et al. Polyurethane internal ureteral stents in treatment of stone patients: morbidity related to indwelling times. *J Urol* 1991; 146: 1487-91. [[PubMed](#)]
20. Joshi HB, Stainthorpe A, Mac Donald RP, Kelley FX Jr, Timoney AG. Indwelling ureteral stents: evaluation of symptoms, quality of life and utility. *J Urol* 2003; 169: 1065-9. [[CrossRef](#)] [[PubMed](#)]
21. Priminger GM, Tiselius HG, Assimos DG, Alken P, Buck C, Gallucci M, Knoll T, Lingeman JE et al. 2007 Guideline for the Management of Ureteral Calculi. *J Urol* 2007; 178:2418. [[CrossRef](#)] [[PubMed](#)]
22. El-Assmy A, El-Nahas A, Youssef FR, El-Hefnawy SA, Sheir ZK. Impact of the degree of hydronephrosis on the efficacy of in situ extracorporeal shock-wave lithotripsy for proximal ureteral calculi. *Scan J Urol Nephrol* 2007; 41(3): 208-13. [[CrossRef](#)] [[PubMed](#)]
23. Halachmi S, Ghersin E, Ginesin Y, Meretyk S. Antegrade pyelography versus unenhanced multidetector CT in the assessment of urinary-tract stones after percutaneous nephrostomy insertion: a prospective blinded study. *J Endourol* 2007; 21: 473-4. [[CrossRef](#)] [[PubMed](#)]

## PERKUTANA NEFROSTOMA I DVOSTRUKI (JJ) URETERALNI STENT KAO PRIVREMENE METODE U REŠAVANJU SUPRAVEZIKALNE OPSTRUKCIJE UZROKOVANE KAMENOM

*Ljubomir Dinić<sup>1</sup>, Jablan Stanković<sup>1,2</sup>, Aleksandar Skakić<sup>1</sup>,  
Marija Milošević<sup>1</sup>, Milan Potić<sup>1</sup>, Svetlana Pavlović<sup>2,3</sup>, Biserka Ignjatović<sup>3</sup>,  
Vladimir Milić<sup>3</sup>, Natalija Vuković<sup>3</sup>, Jelena Kostić<sup>4</sup>, Nataša Đinđić<sup>2</sup>*

Klinika za urologiju, Klinički centar Niš, Srbija<sup>1</sup>  
Univerzitet u Nišu, Medicinski fakultet, Niš, Srbija<sup>2</sup>  
Centar za anesteziju i reanimaciju, Klinički centar Niš, Srbija<sup>3</sup>  
Institut za nefrologiju i hemodijalizu, Klinički centar Niš, Srbija<sup>4</sup>

Kontakt: Ljubomir Dinić  
Klinika za urologiju, Klinički centar Niš, Srbija,  
Bul. Zorana Đinđića 48, Niš,  
E mail: ljubomidinic@gmail.com

Za privremeno rešavanje opstrukcija gornjeg urinarnog trakta koriste se perkutana nefrostoma (PCN) ili ureteralni stent (JJ).

Cilj ovog rada bio je procena efikasnosti ove dve metode upoređivanjem njihovih komplikacija, uspeha plasiranja, urinarnih simptoma, urinokultura pre plasiranja i pre skidanja derivacije i eliminacije kamena nakon litotripsije ekstrakorporalnim udarnim talasima (ESWL). Prospektivnom studijom obuhvaćeno je 157 bolesnika sa suprazvezikalnom opstrukcijom uzrokovanom kamenom uretera. Kod 81 bolesnika plasirana je PCN, a kod 76 JJ stent. Nakon rešavanja opstrukcije, svim bolesnicima je rađen ESWL.

Između dve ispitivane grupe nisu nađene statistički signifikantne razlike u uspehu plasiranja derivacija, u nalazu urinokultura pre i nakon plasiranja i uspehu ESWL tretmana ( $p > 0,05$ ). Urinarni simptomi (dizurija, hematurija, urgentno mokrenje, broj mokrenja u toku dana) bili su statistički značajno češći kod bolesnika sa JJ stentom i ta razlika je signifikantna za svaki od simptoma ( $p < 0,001$ ). Glavne (Major) komplikacije su bile verifikovane kod dva (2,46%) bolesnika sa PCN, a kod sedam (9,2%) u grupi sa JJ stentom. Sporedne (Minor) komplikacije su bile statistički značajno češće u grupi sa JJ stentom u odnosu na grupu sa PCN (28,39% prema 60,52%,  $p < 0,001$ ).

Plasiranja PCN i JJ stenta su optimalne metode za privremeno rešavanje suprazvezikalne opstrukcije uzrokovane kamenom, sa približno jednakom incidencijom pratećih komplikacija, osim bola, koji dominira kod bolesnika sa JJ stentom. Urinarni simptomi i asimptomatska bakterijurija su češći kod bolesnika sa JJ stentom. Ukoliko se ESWL tretman kamena uretera izvodi nakon primenjenih derivacija, veći uspeh možemo očekivati kod bolesnika kojima je plasiran JJ stent. *Acta Medica Medianae* 2015; 54(3):39-44.

**Ključne reči:** perkutana nefrostoma, dvostruki (JJ) ureteralni stent, ESWL

This work is licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) Licence