



## ROLE OF ALPHA BLOCKERS IN REDUCING URINE LEAK AFTER PERCUTANEOUS NEPHROLITHOTOMY IN PATIENTS WITH INDWELLING DJ STENT.

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### KEYWORDS :

#### INTRODUCTION

Fernström and Johansson first described PCNL in 1976 (1) and in the years following, PCNL became the established technique for treatment of large (>2 cm) (2) or otherwise complex kidney stones. However, PCNL is not without complications with a multi-center study showing the overall complication rate of 20.5% (3 - 5). Among various complications of PCNL, urine leakage through the percutaneous tract is quite common and bothersome to the patient as well as treating surgeon. Based on the preoperative assessment of various factors and intraoperative judgement, substantial proportion of patients were left with indwelling DJ stent following PCNL to reduce the incidence of urine leak. But it has been observed that many stented patients suffer from urine leak following nephrostomy tube removal in post operative period. In the present study we intend to investigate the effectiveness of alpha blocker tamsulosin in reducing urine leak in stented patients following nephrostomy tube removal.

#### MATERIALS AND METHODS

After receiving approval from the ethics committee, the study was conducted in S.M.S. Hospital Jaipur from April 2017 to February 2018, and data were recorded prospectively. Patients were evaluated for urine leakage following PCNL. All patients who underwent PCNL and had suffered urine leak lasting more than 12 hours following nephrostomy tube removal were evaluated. Patients who had stage PCNL, history of storage/voiding LUTS, tubeless PCNL, clinically significant residual stones (CSRS), patients whose per urethral catheter was removed after nephrostomy tube for any reason, patients who developed urinary tract infection, patients on alpha blockers, PDE 5 inhibitors, anticholinergics and patients having other medical comorbidities were excluded from this study.

Preoperative evaluation consisted of complete blood count, serum biochemistry, bleeding profile and radiological investigation consisted of X-ray of kidney, ureter, and bladder (KUB) region, ultrasonography (USG) of KUB region, and intravenous urography or computed tomography (CT) urography. The degree of hydronephrosis (HDN) was measured by Society for Fetal Urology Hydronephrosis Grading System (6). Stone complexity was classified using the validated Guy's stone score (GSS).

PCNL was done in prone position, under antibiotic prophylaxis, with standard technique using tract dilatation upto 30 fr. Indications for intraoperative double-J (DJ) stent placement were grade 3 or 4 hydronephrosis, complex stones (GSS 3 or 4), clinically significant residual stones and pelvicalyceal perforation or injury. At the end of procedure, a 16 Fr Nelaton catheter was placed in pelvicalyceal system. Antibiotic therapy was continued until removal of the nephrostomy tube. PCN tube was unclamped on post operative day 1. Residual stones were assessed postoperatively by X-ray KUB. PCN tube was removed on postoperative day 2 if there were no clinically significant residual stones ( $\geq 4$ mm fragment)(7). Access site was dressed with sterile cotton pad and dressing was replaced when the dressing became wet. The procedure was considered successful if the patient was either stone free or had only a clinically insignificant residual stone.

Tefekli et al (8) used modified Clavein grading system to classify urine leak following nephrostomy tube removal. Urine leak lasting <12 hours was classified as grade 2 complication, whereas placement of a

DJ-stent under local anaesthesia for the treatment of urine leakage which is more than 24h was considered a grade 3a complication. Conditions that prolong hospitalization and significantly increase the morbidity are classified under grade 2.

Patients having urine leak persisting for >12 hrs after nephrostomy tube removal, were randomized. Patients operated on even dates were labelled as cases whereas remaining were considered as controls. Cases received tab tamsulosin 0.4 mg while controls received tab B-complex orally once a day. Another 12 hour period is assigned for the onset of drug action and patients who became dry within this window period were excluded from the analysis. Response was observed in terms of presence or absence of urine leak after 24, 48 and 72 hours of drug administration. The amount of urine leak was not quantified in the study.

The data were entered in an Excel (Analyse-it for Microsoft) database and analyzed with an SPSS version 20.0 (IBM SPSS statistics 20 SPSS Inc.) statistical software package using the Chi-square test.  $P < 0.05$  was considered as statistically significant.

#### RESULTS :

A total of 541 patients underwent PCNL during study duration. Out of these, 38 patients had diabetes mellitus, 64 had chronic kidney disease, 37 had LUTS and were taking alpha blockers, staged procedure was done in 27, 9 had tubeless PCNL, 17 had CSRS and were excluded. After exclusion, rest of the patients were observed for urine leak following removal of nephrostomy tube. A total of 197 patients had urine leak lasting for more than 12 hours. Out of 197 patients, 123 were males and 74 were females, grade 3 and 4 hydronephrosis was seen in 77 and complex stones (GSS III, IV) were present in 175 patients. These patients were divided in two groups. 105 patients were assigned as cases and received tamsulosin while the rest 92 operated on odd dates were controls and received placebo. 9 patients became dry within 12 hours of drug administration and hence were excluded from analysis. Out of remaining 188 patients, 72 cases and 64 controls had DJ stent placed intraoperatively while 28 cases and 24 controls did not have DJ stent. Table No. 1 shows distribution of patients with urine leak

**Table 1: Distribution of patients with urine leak**

| Total no. of patients with urine leak after exclusion | No. of Males | No. of females | No. of stented patients with urine leak | No. of non stented patients with leak | Gross HDN | Complex stones |
|---|--------------|----------------|---|---------------------------------------|-----------|----------------|
| 197   | 123          | 74             | 141                                     | 56                                    | 77        | 175            |

**Table 2: Observations of urine leak among cases and controls at 24, 48, and 72 hours after drug administration.**

| (n = 188)      |         | DJ stent in situ |               |         | No DJ stent |               |         |
|----------------|---------|------------------|---------------|---------|-------------|---------------|---------|
|                |         | Cases (72)       | Controls (64) | p-value | Cases (28)  | Controls (24) | p-value |
| Up to 24 hours | Leak    | 25               | 48            | <0.0001 | 12          | 16            | 0.086   |
|                | No leak | 47               | 16            |         | 16          | 8             |         |
| Up to 48 hours | Leak    | 0                | 32            | <0.0001 | 0           | 3             | 0.054   |
|                | No leak | 72               | 32            |         | 28          | 21            |         |
| Up to 72 hours | Leak    | 0                | 7             | 0.004   | 0           | 2             | 0.119   |
|                | No leak | 72               | 57            |         | 28          | 22            |         |

Table No. 2 shows observations of urine leak among cases and controls at 24, 48, and 72 hours after drug administration.

Among the patients with indwelling DJ stent, 47 out of 72 cases (65.28%) were dry by 24 hours of drug administration whereas out of 64 controls, only 16 (25%) are dry after 24 hours. The difference has high level of significance with p-value <0.0001. After 48 hours, none of the stented cases had urine leak as compared to 32 controls out of 64 who had urine leak, with the difference being significant (p value <0.0001). Even after 72 hours, 7 stented controls had urine leak. The difference in observation is also statistically significant with p value 0.004.

Among the patients without DJ stent, observations show difference between cases and controls, with respect to number of patients having urine leak at 24, 48 and 72 hours, but the results are not statistically significant.

#### DISCUSSION:

PCNL has long been the preferred method to treat stones >2cm, stag horn stones, and stones of the inferior lobe <1cm. In addition to the high success rate, a low morbidity rate makes it more advantageous than other surgical techniques (4), (9).

In the present study, Double J stent was placed intraoperatively in 227 patients and that makes it about 42% of total number of patients operated. Such a high rate of DJ stenting in our study was attributed to higher incidence of complex stones (175, 32.3%) and gross hydronephrosis (77, 14.2%) in our patients.

Urine leakage from the drain site after removal of the nephrostomy tube is a common problem (10). Prolonged urine leak duration leads to delayed discharge from hospital.

Ansari et al (11) reported that patients with Grade III, Grade IV hydronephrosis, GSS III, GSS IV, reduced parenchymal thickness, requiring multiple access tract, intra-parenchymal renal pelvis, and residual stones are at increased risk of prolonged urinary leakage and double-J stent should be placed at the end of PCNL procedure. However in our study, we report that a large number of stented patients also developed urine leak. Out of 227 stented patients, 141 develop urine leak lasting for >12 hours after nephrostomy tube removal.

Urine leak in these patients can be ascribed to the reflux of bladder urine into the renal pelvis through DJ stent due to bladder spasms produced as a result of bladder loop of stent irritating the trigone of urinary bladder (12). We also suggest that ureteral spasm around the stent might prevent drainage of urine from side holes of the stent. This urine may get refluxed back into the kidney and may produce urine leak from nephrostomy site.

In a study, Madeb et al (13) has shown the presence of alpha 1 adrenergic receptors in human ureter.

Sigala et al (14) concluded that all the three  $\alpha 1$  adrenergic receptor subtypes are present throughout whole of human ureter with the predominance of  $\alpha 1d$  and  $\alpha 1a$  receptors over  $\alpha 1b$  receptors.

Tamsulosin by its antagonistic effect on  $\alpha 1a$  adrenergic receptors relaxes the bladder trigone as well as the ureter thus preventing bladder spasms induced by stent due to trigonal irritation and hence supposed to prevent urine leak due to reflux of urine through stent and ureteric spasms (15), (16), (17), (18).

In the present study, it is observed that all the patients who were given tamsulosin were dry within 48 hours. On the other hand, 35 out of 88 (39.8%) controls had urine leak continuing beyond 48 hours and 9 continued to leak beyond 72 hours. The difference is significant in case of stented patients (p value- <0.0001) at 24 hours and 48 hours but the difference in non stented patients though appears to be present, is statistically not significant at 24 and 48 hours.

These results can be translated into shorter duration of hospital stay by about 24 to 48 hours for stented patients receiving tamsulosin early after removal of nephrostomy tube.

#### CONCLUSION

Tamsulosin is more effective than placebo in reducing urine leak following nephrostomy tube removal in patients operated for PCNL, with DJ stent in situ.

#### CONFLICTS OF INTEREST

There are no conflicts of interest.

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