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# Percutaneous Nephrostomy is Superior to Ureteric Stenting in the Treatment of Urinary Obstruction in Regard to the Quality of Life and Pain Score

**Conflict of interest:** nothing to declare.  
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## Abstract

**Introduction.** The urinary obstruction occur due to stones, sepsis and acute kidney traumas that can be managed by nephrostomy or ureteral stenting.

**Purpose.** To compare the quality of life (QoL) and pain score between ureteric stenting (US) and percutaneous nephrostomy (PCN) insertion in patients with acute ureteral obstruction secondary to urolithiasis.

**Materials and methods.** This is a prospective, single-centre study compared the QoL in individuals who underwent either PCN or US at period of 12 months at Department of Urology. Totally, 44 cases with renal stones plus obstructing uropathologies were enrolled. The detection of the obstructing ureter and stone site were done by CT or US and x-ray. A percutaneous polyurethane placed or stents were inserted. A guide-wire was inserted into the kidney via the rigid cystoscope. The verbal visual analogue scale (VAS) was used to scored pain. The EuroQol EQ-5D questionnaire was used to QoL assessment.

**Results.** Stone diameters was significantly larger in PCN than in US ( $P<0.05$ ). The distribution of stone sites were significant different between the two groups ( $P<0.05$ ) in which more cases with proximal site (12, 54.5%) underwent PCN while more cases with distal sites (10, 45.5%) underwent US. Significantly, the days of hospitalisation was found to be longer in PCN than US (6.9 days vs. 4.5 days). VAS score of pain in both groups was statistically different ( $P<0.05$ ), which were better in PCN than US. During the procedures, there were no issue of failure. However, there were more subjects with US suffered from stent syndrome (haematuria, storage urinary symptoms and dysuria) than PCN subjects (27.2% vs. 13.6% respectively). Cases undergoing US documented more difficulties in resuming their daily activities (54.5%), movement (31.8%), self-caring (22.8%) and depressed mode (27.3%) than PCN cases [daily activities (36.4%), movement (9.1%), self-caring (9.1%) and depressed mode (13.6%)]. The important point of EuroQol EQ-5D questionnaire noticed in the pain outcome, the number of patients of PCN (7 cases) significantly smaller than cases of US (7 cases) ( $P<0.05$ ).

**Conclusion.** Both US and PCN have negative impact on a patient's QoL, in terms of daily activities, motions and pain. The data of this study supporting the usage of PCN. A marked improvement in a patient's QoL is evidence in PCN than US, since with the use of US, the QoL outcomes significantly worsens over time as compared to those who have PCN.

**Keywords:** ureteric stent, nephrostomy tube, ureteral obstruction, QoL



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## Преимущества чрескожной нефростомии перед стентированием мочеточника в лечении обструкции мочевыводящих путей на основании показателей качества жизни и оценки боли

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### Резюме

**Введение.** Обструкция мочевыводящих путей возникает в результате образования камней, сепсиса и острых травм почек и может быть устранена с помощью нефростомии или стентирования мочеточника.

**Цель.** Сравнить показатели качества жизни (QoL) и уровень боли при проведении стентирования мочеточника (СМ) и чрескожной нефростомии (ЧНС) у пациентов с острой обструкцией мочеточника, обусловленной мочекаменной болезнью.

**Материалы и методы.** В данном перспективном одноцентровом исследовании сравнивали качество жизни (КЖ) лиц, подвергшихся чрескожной нефростомии или стентированию мочеточника в течение 12 месяцев в отделении урологии. В исследовании приняли участие 44 пациента с камнями в почках и обструктивными уропатологиями. Обструкция мочеточника и места расположения камней были выявлены с помощью КТ или УЗИ и рентгенографии. Выполняли чрескожное введение полиуретановой трубки или установку стентов. Проволочный проводник вводили в почечную лоханку с помощью жесткого цистоскопа. Для оценки боли использовалась вербальная визуальная аналоговая шкала (VAS). Для оценки КЖ использовался опросник EuroQoL EQ-5D.

**Результаты.** Диаметр камней у пациентов после ЧНС был значительно больше, чем у пациентов после СМ ( $P < 0,05$ ). Распределение участков образования камней существенно различалось между двумя группами ( $P < 0,05$ ). При этом у пациентов после ЧНС чаще обнаруживали камни в проксимальном отделе (12, 54,5%), а у пациентов после СМ – в дистальном (10, 45,5%). Важно отметить, что продолжительность госпитализации после ЧНС была более длительной, чем после СМ (6,9 дня по сравнению с 4,5 дня). Оценка боли по шкале VAS в обеих группах статистически достоверно различалась ( $P < 0,05$ ) и была лучше у пациентов после ЧНС, чем у пациентов после СМ. У всех пациентов оперативные вмешательства были выполнены успешно. Кроме этого, у пациентов, перенесших СМ, чаще развивались стент-зависимые синдромы (гематурия, симптомы застоя мочи и дизурия), чем у пациентов, перенесших ЧНС (27,2% по сравнению с 13,6% соответственно). У пациентов после СМ отмечено больше сложностей с возвращением к повседневной жизнедеятельности (54,5%), с двигательной активностью (31,8%), с самообслуживанием (22,8%) и выходом из депрессивного состояния (27,3%), чем у пациентов после ЧНС (повседневная

активность – у 36,4%, двигательная активность – у 9,1%, самообслуживание – у 9,1%, выход из депрессивного состояния – у 13,6%). По результатам оценки боли с помощью опросника EuroQol EQ-5D показатели пациентов, перенесших ЧНС (7 случаев), были значительно ниже, чем показатели пациентов, перенесших СМ (7 случаев) ( $P < 0,05$ ).

**Заключение.** Как СМ, так и ЧНС неблагоприятно сказываются на КЖ пациента в плане повседневной жизнедеятельности, двигательной активности и болевых ощущений. Данные настоящего исследования свидетельствуют в пользу проведения ЧНС. Выраженное улучшение КЖ пациентов после ЧНС подтверждает, что этот метод предпочтительнее СМ, поскольку показатели КЖ пациентов, перенесших СМ, значительно ухудшаются с течением времени, в отличие от показателей пациентов, перенесших ЧНС.

**Ключевые слова:** стент мочеочника, нефростомическая трубка, обструкция мочеочника, качество жизни

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## ■ INTRODUCTION

The urinary obstruction occur due to stones, sepsis and acute kidney traumas that manage by nephrostomy or ureteral stenting [1]. Percutaneous nephrostomy (PCN) tube and stenting of ureter (US) are urosurgical drainage procedures [1]. The decision to choose between two techniques is depend on urologist, risks, outcome, complexity, cost, quality of life (QoL) and complication [2]. The ureteral double J stenting is widely used and more practicable, in managing case with acute ureteric obstruction than percutaneous nephrostomy. Several studies compared between these two procedures, however, no conclusive information about best one improve QoL [2, 3].

Joshi and co-authors [4] concluded, there was no difference seen in the overall health conditions. Otherwise, Mokhmalji et al. [5] assessed QoL at two time points immediately following drainage and one month thereafter. Furthermore, the findings were not statistically significant, a tendency toward favourable of PCN over stenting was evident. Zhao et al. [6] mentioned that QoL progressively improved in the PCN group but deteriorated in the stenting group.

## ■ PURPOSE OF THE STUDY

To compare the quality of life (QoL) and pain score between ureteric stenting (US) and percutaneous nephrostomy (PCN) insertion in patients with acute ureteral obstruction secondary to urolithiasis.

## ■ MATERIALS AND METHODS

### **Study design and setting**

This is a prospective, single-centre study compared the QoL and pain score in individuals who underwent either PCN or US at period of 12 months from 13<sup>th</sup> May 2021 to 12<sup>th</sup> May 2022 at Department of Urology.



## Participants

Totally, 44 cases with renal stones plus obstructing uropathologies were enrolled. The detection of the obstructing ureter and stone site were done by CT or US and x-ray.

## Inclusion criteria

1. Obstructing stones.
2. Fever ( $>38^{\circ}\text{C}$ ).
3. Acute renal failure.
4.  $\text{eGFR} \leq 60 \text{ ml/min}$ .
5. Pain.
6. Solitary urolithiasis.
7. Bilateral stones.

## Exclusion criteria

1.  $<18$  years.
2. Pregnancy.
3. Contraindications to the drainage.
4. Uncorrected coagulopathy.
5. Hemodynamic instability.
6. Urinary tract anomalies.
7. Ectopic kidney.

## Data collection

Demographic data included age, gender, BMI, co-morbidities, positive urine culture, stone size and locations, and eGFR and the indications for drainage method were collected.

## Procedure

A percutaneous polyurethane placed or stents were inserted. A guide-wire was inserted into the kidney via the rigid cystoscope. The verbal visual analogue scale (VAS) was used to scored pain [7]. The EuroQol EQ-5D questionnaire was used to QoL assessment [8].

## Statistical analysis

Statistical Package for the Social Sciences software SPSS ver. 24 (IBM, Chicago, USA) used to analysed results. The median, frequencies and percentage were expressed the descriptive data. Unpaired T-test was used to determine the difference between the groups. P-value of less 0.05 is considered significant.

## ■ RESULTS

In total, 22 US subjects and 22 PCN subjects were investigated. The demographics and stone data are presented in Table 1. Age, sex, BMI, eGFR values and comorbidities were non-significant correlated between two arms of the study. Stone diameters was significantly larger in PCN than in US ( $P<0.05$ ). The distribution of stone sites were significant different between the two groups ( $P<0.05$ ) in which more cases with proximal site (12, 54.5%) underwent PCN while more cases with distal sites (10, 45.5%) underwent US. Significantly, the days of hospitalisation was found to be longer in PCN than US (6.9 days vs. 4.5 days).

VAS score of pain in both groups was statistically different ( $P<0.05$ ), which were better in PCN than US. During the procedures, there were no issue of failure. However, there were more subjects with US suffered from stent syndrome (haematuria, storage urinary symptoms and dysuria) than PCN subjects (27.2% vs. 13.6% respectively).

EQ-5D questionnaire outcomes are listed in Table 2. Cases undergoing US documented more difficulties in resuming their daily activities (54.5%), movement (31.8%), self-caring (22.8%) and depressed mode (27.3%) than PCN cases [daily activities (36.4%), movement (9.1%), self-caring (9.1%) and depressed mode (13.6%)]. The important point of EuroQol EQ-5D questionnaire noticed in the pain outcome, the number of patients of PCN (7 cases) significantly smaller than cases of US (7 cases) ( $P<0.05$ ).

The indications of two procedures were listed in Table 3. The only significant difference between the groups were the presence of sepsis, which was more indicated in PCN (12 cases) than US (5 cases).

**Table 1**  
**Demographics and stone data of the study**

| Variables                                                                           |            | US (n=22)<br>n (%) | PCN (n=22) | P-value |
|-------------------------------------------------------------------------------------|------------|--------------------|------------|---------|
| Age (years), median                                                                 |            | 55                 | 52         | NS      |
| Sex                                                                                 | Male       | 12 (54.5)          | 9 (40.9)   | NS      |
|                                                                                     | Female     | 10 (45.5)          | 13 (59.1)  |         |
| BMI (kg/m <sup>2</sup> ), median                                                    |            | 29                 | 27         | NS      |
| Comorbidities                                                                       |            | 12 (54.5)          | 11 (50.0)  | NS      |
| eGFR (mL/min/1.73 m <sup>2</sup> ), median                                          |            | 71.5               | 65.9       | NS      |
| Stone size (cm <sup>3</sup> ), median                                               |            | 1.7                | 2.2        | <0.05   |
| Site of stone                                                                       | Proximal   | 4 (18.1)           | 12 (54.5)  | <0.05   |
|                                                                                     | Mid ureter | 8 (36.4)           | 7 (31.9)   |         |
|                                                                                     | Distal     | 10 (45.5)          | 3 (13.6)   |         |
| Hospitalisation (days), median                                                      |            | 4.5                | 6.9        | <0.05   |
| VAS score of pain                                                                   | Nil        | 5.5±2.5            | 4.6±1.5    | <0.05   |
|                                                                                     | I          | 8.2±2.2            | 3.7±1.2    |         |
| Complication like stent syndrome (haematuria, storage urinary symptoms and dysuria) |            | 6 (27.2)           | 3 (13.6)   | <0.05   |

**Table 2**  
**EuroQol EQ-5D questionnaire outcomes**

| EQ-5D questionnaire | Postoperative (one month) |           | P-value |
|---------------------|---------------------------|-----------|---------|
|                     | PCN                       | US        |         |
|                     | n (%)                     |           |         |
| Movement            | 2 (9.1)                   | 7 (31.8)  | NS      |
| Self-care           | 2 (9.1)                   | 5 (22.8)  | NS      |
| Daily activity      | 8 (36.4)                  | 12 (54.5) | NS      |
| Pain                | 7 (31.8)                  | 13 (59.1) | <0.05   |
| Depression          | 3 (13.6)                  | 6 (27.3)  | NS      |

**Table 3**  
**Indication of US and PCN**

| Indications           | US        | PCN       | P-value |
|-----------------------|-----------|-----------|---------|
|                       | n (%)     |           |         |
| Sepsis                | 5 (22.7)  | 12 (54.5) | <0.05   |
| Dysfunction           | 8 (36.4)  | 10 (45.5) | NS      |
| Pain                  | 13 (59.1) | 6 (27.3)  | NS      |
| Solitary kidney       | 3 (13.6)  | 1 (4.5)   | NS      |
| Bilateral obstruction | 3 (13.6)  | 3 (13.6)  | NS      |

## ■ DISCUSSION

PCN tubes and US are both established, which are used commonly as alternative procedures for relief the obstruction of upper urinary tract, especially in cases of infection, renal failure or severe pain. These two procedures of treatment expected to be equal in efficacy.

Ramsey et al. [9] reported that retrograde stent insertion lead to an increase rate of bacteraemia. Some authors ascertained that stent insertion is significantly more hazardous in cases who presented with acute obstructive symptoms whereas PCN insertion is a preferred drainage method for case presenting with sepsis [10].

Postoperative pain VAS score are comparable in both methods, of which, patients from stenting arm reported high VAS scores than PCN arm. This is dissimilar to other studies [4, 5]. The findings of high postoperative pain in the stenting arm might be explained by the fact that the method was done by passing a rigid cystoscope with local anaesthesia given transurethral. While, in the PCN arm took a longer time for renal system to be recover post drainage, which is supported by Shoshany et al. [11].

Whilst PCN tubes are associated with complications like displacement (bag leakage) and sepsis [12, 13], procedure complication rates were higher in the stenting group, opposing the outcomes [11].

Commonly, ureteric stents are associated with fewer urinary tract symptoms and various pain degrees in the bladder region due to mechanical irritation [14, 15], and these have effects on a patient's general health, daily activities, mood and motions [4].

Furthermore, the number of visiting to emergency room be greater in US arm than PCN group. In PCN cases, they suffered from discomfort and difficulties in movement, personal hygiene domains and self-care due to the presence of the tube. Our findings are corroborated with other studies [3, 6] which shown, during time, the general symptoms in PCN cases improved but in US cases it worsened. Nevertheless, the data of this study supported superior QoL in patients underwent nephrostomy tube insertion.

## ■ CONCLUSION

Both US and PCN have negative impaction on a patient's QoL, in terms of daily activities, motions and pain. The data of this study supporting the usage of PCN. A marked improvement in a patient's QoL is evidence in PCN than US, since with the use of US, the QoL outcomes significantly worsens over time as compared to those who have PCN.

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